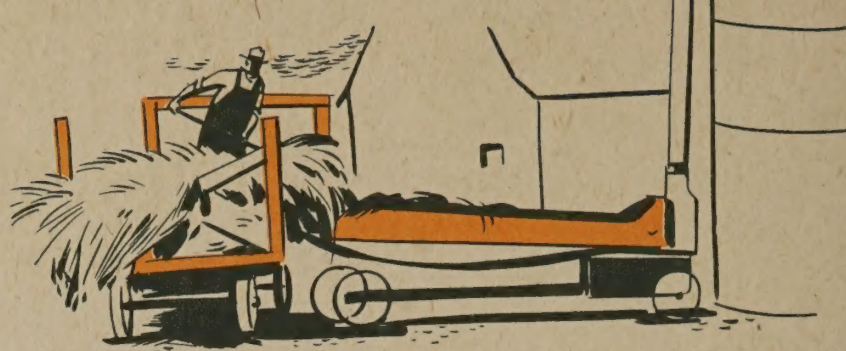




farm facts book



1945



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OUR JOB IS SERVING YOU . . .

This Farm Facts Book has been prepared as a friendly service for customers of our organization and their friends, and is presented with the compliments of your Cities Service representative.

Packed with practical information, arranged wherever possible in convenient charts and tables, it is intended to serve as a useful reference and as a handy guide for the modern farmer, whose farm is largely mechanized.

A glance at the table of contents will show the wide diversity of subjects covered in this booklet and will suggest how convenient and

useful it can be for you. We believe you will find it advisable to keep it handy all year round.

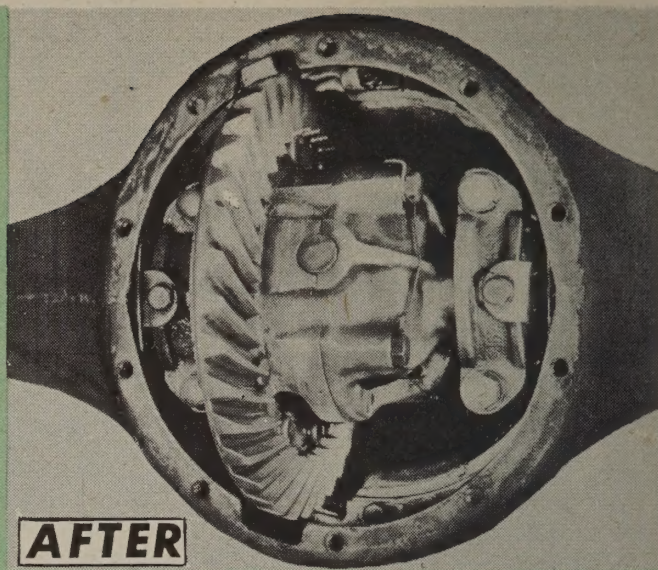
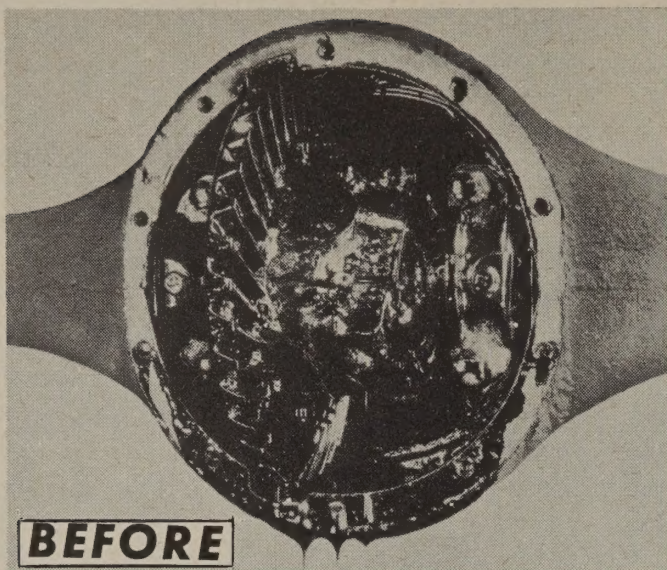
Your Cities Service representative wants to be of service to you in every way possible. His business is built on a foundation of good service, and he will be glad to have you call on him for personal help in meeting your fuel and lubrication problems.

We hope the information contained in these pages helps you save time and prolongs the life of your farm machinery. This is what it is for.



CITIES SERVICE OIL COMPANY

ARKANSAS FUEL OIL COMPANY



Avoid Needless Wear

PROTECT GEARS AND BEARINGS FROM SLUDGE, GUM, METAL PARTICLES AND ABRASIVES

Cisco Solvent quickly cleans transmissions and differentials of sludge, decomposed oil and grit. Dirty lubricants cause needless wear of vital gears and bearings. Even when old lubricants are drained, some of the contaminated oil adheres to the gears and walls of the gear housings. Cisco Solvent cleans thoroughly. It is also an inexpensive and effective medium for cleaning out the oiling system—freeing the oil lines, oil channels and bearing clearances.

**JUST ASK
FOR C CISCO SOLVENT**

HELP RESTORE POWER AND PICKUP

CITIES SERVICE CISCO PEP is a help to all farm vehicles. When used in accordance with recommendations it will contribute in no small way to improved operating performance, reduced maintenance cost—and, most important of all—a longer useful life for your farm vehicles. Regular use of this outstanding product is now standard practice with many successful farmers—it pays off in results.

- Helps to free sticky valves
- Helps prevent gum formation



MOON PHASES BY MONTHS • 1945

JANUARY  Last Quarter..... 6  New Moon.....14  First Quarter.....21  Full Moon.....28	FEBRUARY  Last Quarter..... 5  New Moon.....13  First Quarter.....19  Full Moon.....27	MARCH  Last Quarter..... 7  New Moon.....14  First Quarter.....21  Full Moon.....29
APRIL  Last Quarter..... 6  New Moon.....12  First Quarter.....19  Full Moon.....27	MAY  Last Quarter..... 5  New Moon.....12  First Quarter.....19  Full Moon.....27	JUNE  Last Quarter..... 4  New Moon.....10  First Quarter.....18  Full Moon.....26
JULY  Last Quarter..... 3  New Moon.....10  First Quarter.....17  Full Moon.....25  Last Quarter.....31	AUGUST  New Moon..... 8  First Quarter.....16  Full Moon.....23  Last Quarter.....30	SEPTEMBER  New Moon..... 6  First Quarter.....15  Full Moon.....22  Last Quarter.....28
OCTOBER  New Moon..... 6  First Quarter.....14  Full Moon.....21  Last Quarter.....28	NOVEMBER  New Moon..... 5  First Quarter.....13  Full Moon.....20  Last Quarter.....27	DECEMBER  New Moon..... 5  First Quarter.....12  Full Moon.....19  Last Quarter.....26

ECLIPSES IN 1945

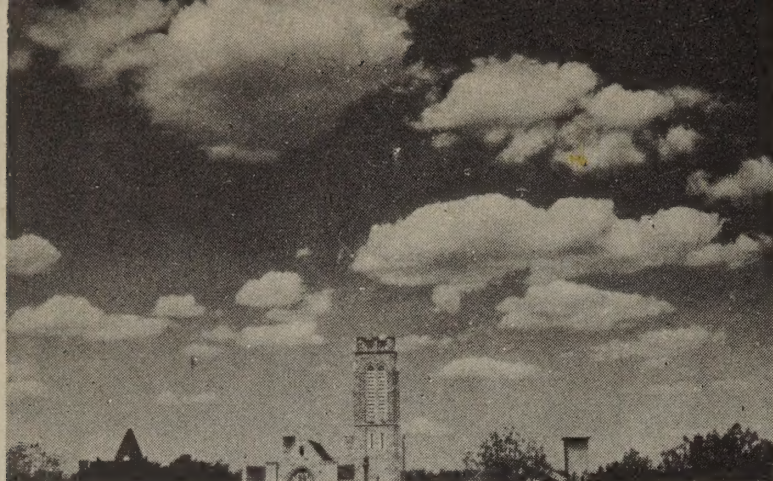
In 1945 there will be four eclipses, two of the sun and two of the moon.
 January 14—An annular eclipse of the sun. Not visible in the United States.
 June 25—A partial eclipse of the moon. Invisible in the United States.
 July 9—A total eclipse of the sun. Visible in the United States.
 December 18-19—A total eclipse of the moon. Visible in the United States.

DATES COVERED BY THE SIGNS OF THE ZODIAC

SIGN	DATES
Aquarius.....	Jan. 21-Feb. 19
Pisces.....	Feb. 20-Mar. 21
Aries.....	Mar. 22-Apr. 20
Taurus.....	Apr. 21-May 21
Gemini.....	May 22-June 21
Cancer.....	June 22-July 23
Leo.....	July 24-Aug. 23
Virgo.....	Aug. 24-Sept. 23
Libra.....	Sept. 24-Oct. 23
Scorpio.....	Oct. 24-Nov. 22
Sagittarius.....	Nov. 23-Dec. 22
Capricorn.....	Dec. 23-Jan. 20

HOLIDAYS FOR 1945

EVENT	DATE	DAY OF WEEK
New Year's Day.....	Jan. 1....	Mon.
Lincoln's Birthday.....	Feb. 12...	Mon.
Washington's Birthday...	Feb. 22...	Thur.
Good Friday.....	Mar. 30....	Fri.
Easter Sunday.....	Apr. 1....	Sun.
Memorial Day.....	May 30...	Wed.
Independence Day.....	July 4....	Wed.
Labor Day.....	Sept. 3....	Mon.
Columbus Day.....	Oct. 12....	Fri.
Armistice Day.....	Nov. 11...	Sun.
Thanksgiving Day.....	Nov. 22...	Thur.
Christmas Day.....	Dec. 25...	Tue.



Cumulus—small and fluffy white in a deep blue sky, the scattered tufts of cumulus clouds indicate fine weather, especially in summer.



Cumulonimbus—heavy masses of clouds with summits rising like mountains, generally produce showers, thunder, and sometimes hail.

“If woolly fleeces spread the heavenly way,

No rain, be sure, disturbs the summer day.”



Clouds play a leading role in knowledge of the weather. It should be remembered, however, that weather is influenced by many factors and a saying that considers only one of these may not always be accurate. Cumulus clouds look like heaps of white wool and are characteristic of bright, sunny days with fair weather ahead.

“When the smoke goes west, good weather is past.

When the smoke goes east, good weather is next.”



Wind direction, when combined with the barometer reading, is an accurate indicator, and its force is also an important factor.

Stratocumulus—patches of fairly large globular masses or rolls, soft and gray with darker parts. Often form the most striking sunsets.



★ W E A T H E R T H A T H A V E A

For thousands of years people have had reason to study the familiar things around them for signs of changing weather. Their knowledge grew into sayings and rhymes which were handed down through generations. Many of these weather proverbs and beliefs are based on scientific facts and are therefore reasonably trustworthy. Others are founded on the effects of atmospheric conditions on plants or

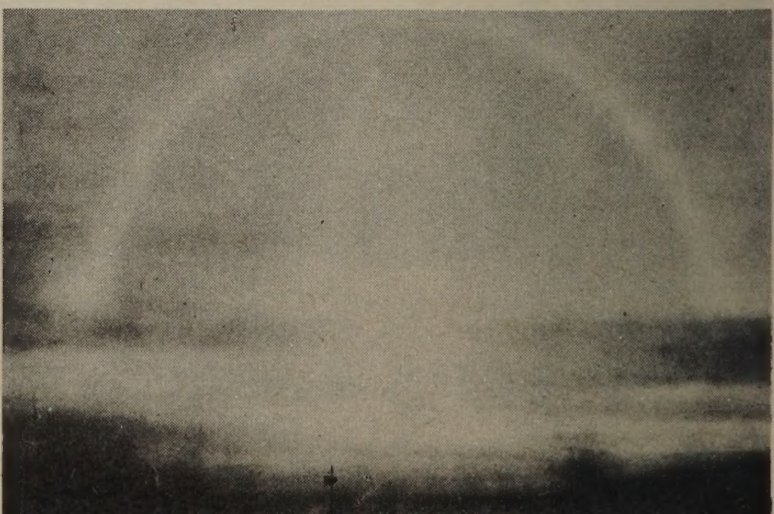
“Ring around the moon is a sign of rain.

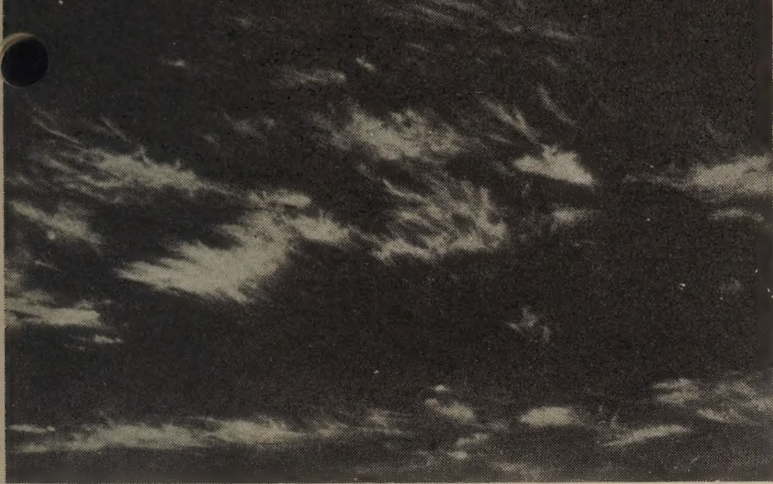
The larger the ring, the nearer the rain.”



Moonlight shining through the ice of cirrus clouds, which foretell rain, causes the halo much like the light of a street lamp through a frosted window pane.

Halos or rings around the moon or sun generally mean rain or snow within 24 hours. One of the surest signs. Clouds are usually cirrostratus.





Cirrus—usually delicate, wispy, silky filaments known as “mares” tails. They are composed of ice crystals and are usually transparent.



Altocumulus—patches of globular, irregular masses resulting from degeneration of a cloud sheet. Arranged in groups, lines, or waves.

PROVERBS ★ SCIENTIFIC BASIS

animals and are only sometimes true. Some are not trustworthy because they are derived from mistaken beliefs such as that the moon or some other heavenly body has an effect on the weather or because they attempt to forecast the weather over a long period of time.

The oft-heard proverbs on these pages are more likely to be reliable because they are based on scientific knowledge.

*“Evening gray, morning red,
Keeps the traveler in his bed.
Evening red, morning gray,
Sends the traveler on his way.”*



A dark red sky in the morning occurs when the humidity is high and therefore rain is likely. A gray early morning sky following a red sky in the evening, shows that the humidity has been lowered



A rainbow always appears in the side of the sky opposite the sun. It is formed by the sun’s rays passing through rain. In order to see the rainbow a person must necessarily be between the sun and the rain. Thus, in the morning when the sun is in the east, a rainbow indicates that rain is in the west—moving eastward. A rainbow in the evening means that rain is in the east and has therefore passed.

“Rain before seven, clear before eleven.”



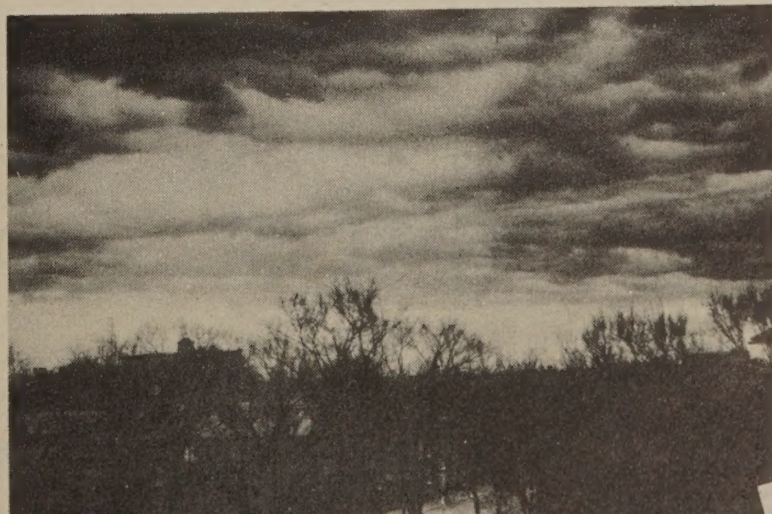
This saying is frequently correct because rain clouds move on to the east a considerable distance in that period of time.

It is seldom that a cloud contains sufficient moisture to continue raining for five hours. The sun’s heat also tends to dry up the cloud.

Altostratus—a smooth, gray or bluish veil like thick cirrostratus. The sun or moon usually shows with a faint gleam as through ground glass.



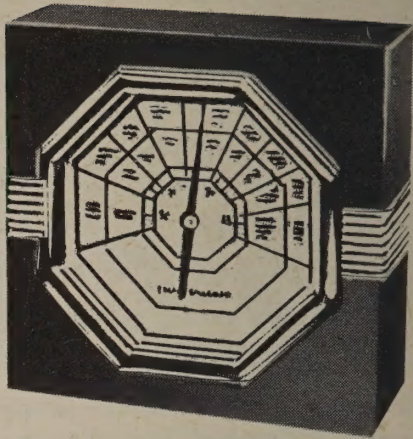
Stratocumulus—soft gray rolls or waves aligned in one or two directions. Very often so close together their edges join, covering the whole sky.



THE BAROMETER

and How to Use It

Barometers are of several types but they are all used to measure the weight of the air. The important thing to notice in forecasting is whether the barometer is rising or falling and how rapidly. The rapidity of a storm's approach and its intensity are proportional to the amount of the fall of the barometer. Accuracy of forecasting is increased by combining barometer readings with observed wind directions.



WIND-BAROMETER TABLE

WIND DIRECTION	BAROMETER REDUCED TO SEA LEVEL	CHARACTER OF WEATHER INDICATED
SW. to NW.	30.10 to 30.20 and steady.	Fair, with slight temperature changes, for 1 to 2 days.
SW. to NW.	30.10 to 30.20 and rising rapidly.	Fair, followed within two days by rain.
SW. to NW.	30.20 and above stationary.	Continued fair, with no decided temperature change.
SW. to NW.	30.20 and above and falling slowly.	Slowly rising temperature and fair for two days.
S. to SE.	30.10 to 30.20 and falling slowly.	Rain within 24 hours.
S. to SE.	30.10 to 30.20 and falling rapidly.	Wind increasing in force, with rain within 12 to 24 hours.
SE. to NE.	30.10 to 30.20 and falling slowly	Rain in 12 to 18 hours.
SE. to NE.	30.10 to 30.20 and falling rapidly.	Increasing wind and rain within 12 hours.
E. to NE.	30.10 and above and falling slowly.	In summer, with light winds, rain may not fall for several days. In winter, rain within 24 hours.
E. to NE.	30.10 and above and falling rapidly.	In summer, rain probably within 12 to 24 hours. In winter, rain or snow, with increasing winds, will often set in when the barometer begins to fall and the wind sets in from the NE.
SE. to NE.	30.00 or below and falling slowly.	Rain will continue 1 to 2 days.
SE. to NE.	30.00 or below and falling rapidly.	Rain, with high wind, followed within 36 hours, by clearing, and in winter by colder.
S. to SW.	30.00 or below and rising slowly.	Clearing within a few hours, and fair for several days.
S. to E.	29.80 or below and falling rapidly.	Severe storm imminent, followed within 24 hours, by clearing, and in winter by colder.
E. to N.	29.80 or below and falling rapidly.	Severe northeast gale and heavy precipitation in winter, heavy snow followed by cold wave.
Going to W.	29.80 or below and rising.	Clearing and colder.

DATES OF KILLING FROSTS **IN NUMEROUS SECTIONS OF THE U. S. A.**

(Compiled from U.S. Weather Bureau Report for 1935)

Station	Averages and extremes of killing frost for 30 to 51 years						
	Date of last kill- ing frost in spring, 1934	Date of first killing frost in fall, 1934	Spring frosts		Fall frosts		Length of growing season Days
			Latest date	Average date	Earliest date	Average date of first	
Portland, Maine.....	Apr. 29	Oct. 5	June 20	Apr. 19	Sept. 11	Oct. 17	181
Concord, N. H.....	Apr. 29	Oct. 10	June 5	May 7	Sept. 6	Oct. 3	149
Boston, Mass.....	Apr. 5	Oct. 13	May 16	Apr. 14	Sept. 26	Oct. 26	195
Hartford, Conn.....	Apr. 29	Nov. 2	May 12	Apr. 20	Sept. 11	Oct. 13	177
Albany, N. Y.....	Apr. 29	Oct. 14	May 30	Apr. 24	Sept. 15	Oct. 15	174
Trenton, N. J.....	Apr. 5	Nov. 3	May 12	Apr. 16	Oct. 11	Oct. 24	191
Harrisburg, Pa.....	Apr. 28	Oct. 14	May 12	Apr. 9	Oct. 3	Oct. 28	202
Cincinnati, Ohio.....	Apr. 28	Nov. 2	Apr. 28	Apr. 8	Sept. 30	Oct. 23	198
Toledo, Ohio.....	Apr. 28	Oct. 14	May 29	Apr. 22	Sept. 9	Oct. 18	179
Evansville, Ind.....	Mar. 28	Nov. 12	Apr. 26	Apr. 5	Oct. 9	Oct. 29	207
Fort Wayne, Ind.....	Apr. 25	Oct. 30	May 28	Apr. 25	Sept. 14	Oct. 13	171
Cairo, Ill.....	Mar. 28	Nov. 12	Apr. 30	Mar. 31	Sept. 30	Oct. 29	212
Chicago, Ill.....	Apr. 13	Oct. 28	May 25	Apr. 16	Sept. 20	Oct. 19	186
Alpena, Mich.....	May 12	Oct. 10	June 9	May 13	Sept. 6	Oct. 1	141
Detroit, Mich.....	May 12	Oct. 13	May 31	Apr. 28	Sept. 21	Oct. 15	170
Ludington, Mich.....	May 25	Oct. 19	June 17	May 2	Sept. 4	Oct. 21	172
Marquette, Mich.....	Apr. 28	Oct. 19	June 6	May 13	Aug. 23	Oct. 9	149
Green Bay, Wisc.....	May 12	Oct. 28	May 30	May 5	Sept. 16	Oct. 9	157
Madison, Wisc.....	Apr. 27	Oct. 28	May 25	Apr. 26	Sept. 16	Oct. 17	174
Duluth, Minn.....	May 15	Oct. 26	June 14	May 6	Sept. 10	Oct. 5	152
Minneapolis, Minn.....	Apr. 27	Oct. 28	May 20	Apr. 27	Sept. 13	Oct. 10	166
Des Moines, Ia.....	Apr. 25	Oct. 28	May 31	Apr. 21	Sept. 13	Oct. 9	171
St. Joseph, Mo.....	Mar. 31	Oct. 28	Apr. 28	Apr. 9	Sept. 26	Oct. 17	191
Springfield, Mo.....	Mar. 31	Oct. 28	May 19	Apr. 12	Sept. 30	Oct. 22	193
Bismarck, N. Dak.....	Apr. 27	Sept. 15	June 7	May 11	Aug. 23	Sept. 21	133
Pierre, S. Dak.....	Apr. 24	Sept. 26	May 24	Apr. 30	Sept. 12	Oct. 7	160
Omaha, Nebr.....	Apr. 25	Oct. 28	May 19	Apr. 14	Sept. 18	Oct. 15	184
Wichita, Kans.....	Mar. 31	Nov. 11	May 15	Apr. 9	Sept. 23	Oct. 23	197
Richmond, Va.....	Mar. 30	Oct. 14	Apr. 26	Mar. 31	Oct. 12	Nov. 2	216
Parkersburg, W. Va.....	Apr. 28	Oct. 14	May 22	Apr. 17	Sept. 29	Oct. 18	184
Raleigh, N. C.....	Mar. 13	Oct. 29	Apr. 26	Mar. 27	Oct. 8	Nov. 5	223
Columbia, S. C.....	Mar. 15	Nov. 12	Apr. 17	Mar. 17	Oct. 30	Nov. 18	246
Macon, Ga.....	Mar. 13	Nov. 13	Apr. 18	Mar. 14	Oct. 11	Nov. 14	245
Miami, Fla.....	none	Dec. 12	Mar. 3	*	Nov. 21	*	*
Chattanooga, Tenn.....	Mar. 20	Nov. 12	May 14	Mar. 29	Sept. 30	Nov. 4	220
Montgomery, Ala.....	Mar. 15	Nov. 13	Apr. 5	Mar. 8	Oct. 21	Nov. 13	250
Shreveport, La.....	Mar. 19	Dec. 1	Apr. 9	Mar. 6	Oct. 20	Nov. 12	251
Del Rio, Tex.....	Jan. 9	Dec. 20	Mar. 27	Feb. 23	Oct. 27	Nov. 27	277
El Paso, Tex.....	Mar. 19	Nov. 22	Apr. 26	Mar. 19	Oct. 23	Nov. 16	242
Oklahoma City, Okla.....	Mar. 19	Dec. 1	Apr. 30	Mar. 30	Oct. 7	Nov. 3	218
Little Rock, Ark.....	Mar. 19	Nov. 23	Apr. 26	Mar. 18	Oct. 22	Nov. 14	241
Helena, Mont.....	May 13	Sept. 19	June 9	May 7	Aug. 25	Sept. 29	145
Lander, Wyo.....	Apr. 19	Sept. 15	June 20	May 18	Aug. 23	Sept. 18	123
Denver, Colo.....	May 13	Sept. 26	June 6	May 3	Sept. 12	Oct. 10	160
Santa Fe, N. Mex.....	Apr. 7	Nov. 2	May 23	Apr. 25	Sept. 25	Oct. 19	177
Phoenix, Ariz.....	none	Nov. 30	Mar. 31	Feb. 10	Nov. 5	Dec. 3	296
Tucson, Ariz.....	Apr. 4	Nov. 21	Apr. 4	Mar. 11	Oct. 22	Nov. 9	243
Yuma, Ariz.....	none	none	Mar. 15	Jan. 20	Nov. 19	Dec. 20	334
Salt Lake City, Utah.....	Apr. 2	Nov. 21	June 18	Apr. 18	Sept. 22	Oct. 20	185
Reno, Nev.....	Apr. 4	Sept. 26	June 13	May 14	Sept. 6	Oct. 6	145
Lewiston, Ida.....	Apr. 4	Sept. 25	May 10	Apr. 6	Sept. 21	Oct. 24	201
Pocatello, Ida.....	Apr. 3	Sept. 27	June 1	Apr. 29	Sept. 8	Oct. 6	160
Spokane, Wash.....	Apr. 15	Sept. 25	June 8	Apr. 14	Sept. 7	Oct. 13	182
Portland, Ore.....	none	none	May 2	Mar. 15	Oct. 13	Nov. 21	251
Roseburg, Ore.....	none	none	May 24	Apr. 8	Sept. 24	Nov. 11	217
Eureka, Calif.....	none	none	Apr. 7	Mar. 16	Nov. 11	Dec. 18	277
Lqs Angeles, Calif.....	none	none	Feb. 17	*	Nov. 2	*	*
Sacramento, Calif.....	none	none	May 7	Feb. 19	Nov. 11	Nov. 29	283
San Bernardino, Calif.....	Apr. 4	Nov. 22	Apr. 23	Mar. 8	Oct. 23	Nov. 22	259
San Diego, Calif.....	none	none	Jan. 20	*	Dec. 26	*	*
San Francisco, Calif.....	none	none	Mar. 26	Jan. 13	Dec. 4	Dec. 29	350

FOR GREATER PROTECTION USE HEAT-PROVED MOTOR OILS



FOR TRACTOR, CAR, AND TRUCK

Cities Service Motor Oils stand up under extreme operating conditions and give long-lasting protection. They are *heat-proved*—subjected to far greater temperatures at the refinery than they ever will have to withstand in the crankcase of your engines.

CITIES SERVICE MOTOR OIL

Made from the finest Mid-Continent crudes, Cities Service Motor Oil will help give your engine new stepped-up power. A high-quality, *heat-proved* oil, it seals, lubricates and cools.

KOOLMOTOR MOTOR OIL

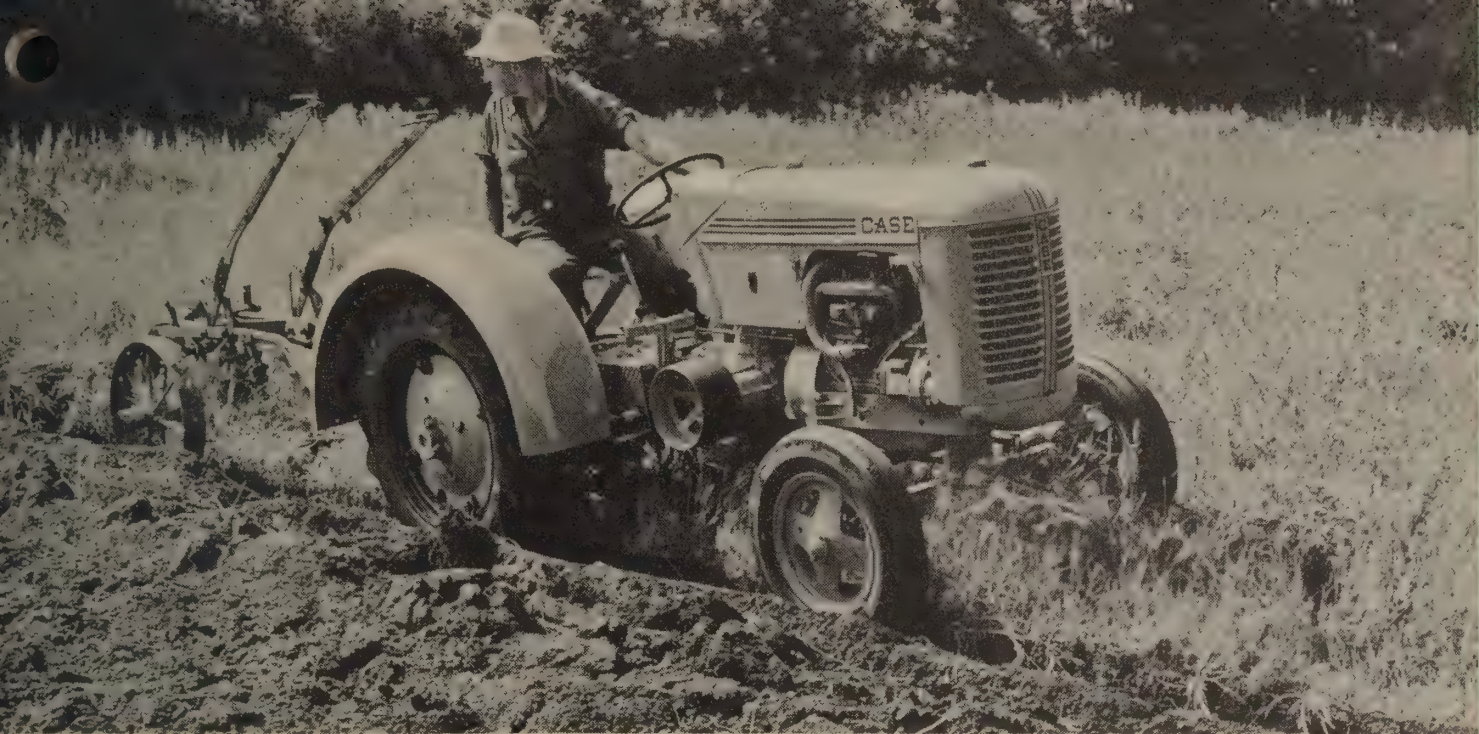
As fine an oil as money can buy—super-blended, superfiltered, and *heat-proved* besides. Made from 100% Pennsylvania crudes, time-tested source of fine lubricants. *Every drop lubricates.*

HEAVY DUTY MOTOR OILS

Fit the oil to the job for greater economy. For extremely heavy duty service, Heavy Duty Motor Oils should be used. Ask your Cities Service representative for proper recommendation for your equipment.

PLACE YOUR ORDER NOW





DO'S AND DON'TS

FOR LONGER TRACTOR LIFE

DO

Protect Gears and Engine

Gears are vital, costly and hard to get. To protect them, it is important to change oils and greases at recommended intervals. When changing transmission and differential lubricants, take time to remove all the sludge, grit, and tiny particles that adhere to the gears. The use of Cities Service Cisco Solvent does the gear and engine cleaning jobs with little effort.

Warm Up the Engine

Always take time to warm the engine thoroughly in the morning before starting the day's work. This is especially important in cold weather. By all means don't race the motor during the warm-up.

Keep Battery Water Up

The water level in your tractor's battery should be kept about $\frac{3}{8}$ inch above the plates. A fully charged battery will not freeze.

Clean Fuel and Air Filters

As often as twice a month, depending on the amount of dust you encounter, it's wise to clean the fuel and air filters.

Lubricate Properly

Follow carefully the suggestions on page 12—your time will be well repaid.

DON'T

Don't Neglect Your Tires

Schedule a regular time each week for checking your tractor tires and you'll get longer tire life and better performance. Look over your tires regularly for casing brakes. Make sure you are getting all possible traction. Slippage causes excessive wear. See the tables on page 16 for the recommended wheel weights.

Don't Pour Cold Water in a Hot Engine

Never pour cold water into a hot engine. Let it cool gradually. Do not drain the radiator immediately after use in freezing weather.

Don't Drive Too Fast

Be careful about putting the tractor into a speed too high for the load it is carrying—always shift back into second or low gear and you'll save time and save your tractor. Remember not to drive fast over rough ground—it gives your tractor (and yourself) a severe pounding.

Don't Expose Your Tractor

Keep your tractor out of the bright sun when it is not in use—the sun is hard on paint and tires. Avoid letting your tractor stand where oil will get on the tires and it will pay to wash the tires with water after spraying or dusting with copper mixtures.

GUIDE TO PROPER TRACTOR LUBRICATION

Unit or Part	Gears	Pressure Fitting	Grease Cup	Oil Cup or Hand Oiler	Hand Packed	REMARKS
Engine	See Cities Service Tractor Chart or manufacturer's recommendation					See Page 14
Transmission, Differential and Final Drive	"	"	"	"	"	"
Fan		A-0, A-1 or A-2	A-3	EO		Some tractors have fan lubricated from engine, others grease packed at factory, in which case no additional lubrication required.
Steering Mechanism	ST	A-0, A-1 or A-2				Some tractors have fitting to lubricate steering gears, others have a plug or cover plate which must be removed.
Water Pump		W-5	W-5	EO		Some tractors have impregnated bronze bushing, others grease packed at factory, in which case no additional lubrication required.
Magneto, Starter, Generator				EO		Some use impregnated bearings or are packed when assembled. No additional lubrication required.
Distributor		A-0, A-1 or A-2	A-3	EO		
Universal Joints		A-0, A-1 or A-2		GO	A-1 or A-2	
Wheels		A-2 or A-3	A-3		A-2 or A-3	For plain bearings provided with oil reservoir, use Cities Service or Koolmotor Gear Oil S.A.E. No. 140, Summer; S.A.E. 80, Winter.
Rear Axle Outer Bearings			A-3			
Master Clutch Pilot Bearing Release Bearing Clutch Shift Collar		A-0, A-1 or A-2				Some tractors have clutch throw-out mechanism automatically lubricated from engine.
Crawler Track Wheels						ALLIS-CHALMERS With "Positive-Seal" Assemblies:— Koolmotor Motor Oil: Above 32° F. use S.A.E. 40; 0° to 32° F. use S.A.E. 20; below 0° F. use S.A.E. 10. Without "Positive-Seal" Assemblies (If equipped with fittings): Cities Service or Koolmotor Gear Oil: Above 32° F. use S.A.E. 140; 10° F. to 32° F. use S.A.E. 90; below 10° F. use S.A.E. 80. Other Models (Grease lubricated): Use Trojan Grease A-0 or A-1, or Tractor Roller Lubricant No. 00 or No. 1. CLETRAC: Cities Service or Koolmotor Motor Oil: S.A.E. 20 to 70, depending on atmospheric temperatures. OTHERS: Grease Lubricated: Trojan Grease A-0 or A-1, or Tractor Roller Lubricant No. 00 or No. 1. Oil Lubricated: Cities Service or Koolmotor S.A.E. 80 or 140, depending on atmospheric temperatures.
Power Take-Off, Belt Pulley, Motor Lift Power Reduction	GO	A-0, A-1 or A-2	A-3			Where separately lubricated
Other Chassis Points		A-0, A-1 or A-2	A-3	EO		
Key to abbreviations A-0, A-1, A-2, A-3—Trojan Grease A-0, A-1, A-2, A-3; EO—Engine Oil; GO—Cities Service or Koolmotor Gear Oil; ST—Cities Service Steering Gear Lubricant; W-5—Trojan Grease W-5.						

TRACTOR Trouble-Shooter's GUIDE



Listed here are some of the common performance troubles with the most usual method of correcting them. To list all possible causes of failures would require a huge manual—but this chart will help you correct minor troubles. However, we advise you not to attempt major repairs.

IF THIS HAPPENS	LOOK FOR THESE CAUSES OF TROUBLE
STARTER WON'T WORK	Gears engaged and brakes set—Weak battery—Loose wiring connections—Defective starting motor—Crankcase oil too heavy (in winter)—Frozen water pump—Stuck pistons.
STARTER WORKS BUT ENGINE WON'T START	Make sure ignition is on and tractor is not out of fuel—Fuel pump failure—Clogged strainers—Choke not working or engine “flooded”—Faulty timing—Spark plugs wet, fouled, cracked or improperly gapped—Distributor or magneto wet—Magneto or distributor points fouled, burned or improperly adjusted—Defective coil or condenser.
ENGINE MISSES	Ignition wires loose, broken, corroded—Plugs wet, dirty, cracked, mis-gapped—Carburetor misadjusted; choke not working—Diesel injection pump or nozzle faulty; leaks—Manifold heat control improperly set—Valves stuck, leaking, burned; incorrect clearance—Defective coil or condenser—Leaky gaskets (intake manifold or cylinder head).
ENGINE HEATS UP	Brakes set or dragging—Excessive load or speed—Water low—Loose fan belt; frozen or clogged radiator—Carburetor too lean—Thermostat stuck; water pump not working—Incorrect timing—Manifold heat control improperly set—Retarded spark.
TRACTOR LACKS POWER	Brakes set; dragging—Poor compression; leaky valves; worn, stuck rings—Air cleaner clogged—Carburetor too rich or lean; choke stuck—Incorrect timing—Diesel fuel filters dirty; injection trouble—Pulling too much load—Engine overheated or missing—see above.
ENGINE KNOCKS	Engine overheated (above)—Engine oil low—Carburetor too lean—Excessive carbon—Incorrect fuel—Sticking valves—Incorrect timing—Worn bearings. (Note: Certain fuel characteristics limited by Gov't. restrictions may cause knocking. An adjustment by a capable mechanic can correct combustion and power output).
SMOKE FROM EXHAUST	Overloading—Carburetor or choke incorrectly adjusted—Improper fuel—Ring trouble—Diesel fuel injection timing late; leaking—Loose bearings or worn valve guides—Overlubrication; excess oil—Engine missing (above).
USING TOO MUCH OIL	Wrong grade of oil—Oil badly diluted—Oil level too high—Excessive idling—Leaks (lines, gaskets, bearings)—High engine speed—Ring trouble—Loose bearings; valve guides.
USING TOO MUCH FUEL	Excessive idling—Long operation in lower gears—Overloading; poor traction—incorrect carburetor setting; choke stuck—Diesel injector faulty—Engine misses (see section above)—Dirty air cleaner—Fuel leaks; engine overheats (above).

FARM TRACTOR LUBRICATION GUIDE

MAKE AND MODEL	CRANKCASE				TRANSMISSION AND DIFFERENTIAL		FINAL DRIVE	
	Lowest expected atmospheric temperature:				Above +32	Below +32	Above +32	Below +32
	Over 90°	+32	+10	Below +10				
	SAE No.	SAE No.	SAE No.	SAE No.	SAE No.	SAE No.	SAE No.	SAE No.
ALLIS-CHALMERS								
B (with hydraulic pump)	30	20	20W	10W	20	20	140	90
B (without hydraulic pump)	30	20	20W	10W	140	90	140	90
C	30	20	20W	10W	20	20	140	90
HD-7, HD-10, HD-14	30	30	20	10	50, 40	30, 20	50, 40	30, 20
K, WK	40	30	20W	10W	50, 40	30, 20	50, 50	30, 20
KO, WKO	30	20	20W	10W	50, 40	30, 20	50, 40	30, 20
L, LL	40	30	20W	10W	50, 40	30, 20	50, 40	30, 20
LO, LLO	30	20	20W	10W	50, 40	30, 20	50, 40	30, 20
M, WM	40	30	20W	10W	50, 40	30, 20	50, 40	30, 20
RC	30	20	20W	10W	140	90	250	90
WC	40	30	20W	10W	140	90	250	90
S, WS, Oil Eng. Tractor, SO, WSO	30	30	20W	10W	50, 40	30, 20	50, 40	30, 20
U	40	30	20W	10W	140	90	—	—
UC	40	30	20W	10W	140	90	140	90
J. I. CASE								
C, D, L	30	20	20W	10W	140	90	—	—
CC, DC	30	20	20W	10W	140	90	—	—
LA	30	20	20W	10W	140	90	—	—
R, RC	30	20	20W	10W	140	90	—	—
S, SO, SC	30	20	20W	10W	140	90	—	—
V, VC, VO	30	20	20W	10W	140	90	—	—
"CATERPILLAR"								
D2, D4, RD4	20	20	10	10	90	80	90	80
D6, RD6 (with oil cooler)	20	20	10	10	90	80	90	80
D35, D40	30	30, 20	20, 10	10	90	80	90	80
D7 (Series 7M)	20	20	10	10	90	80	90	80
D7 (Series 9G), RD7 (with oil cooler)	20	20	10	10	90	80	90	80
D7 (Series 9G), RD7 (without oil cooler)	30	30, 20	20, 10	10	90	80	90	80
D50 (without oil cooler)	30	30, 20	20, 10	10	90	80	90	80
D8, RD8 (with oil cooler)	20	20	10	10	90	80	90	80
D75	30	30, 20	20, 10	10	90	80	90	80
R2, R4	30	30	10	10	90	80	90	80
R5, 35, 40, 50, 70	30	30	20	20	90	80	90	80
10, 15, 20 (Series 8C), 22	30	30	20	20	90	80	90	80
20 (Series L1, PL1), 25, 28	30	30	20	20	90	80	90	80
"CLETRAC"								
AD, BD, DD	30	30	20	10	40-60	30	40-60	30
AG, BG, CG, DG	40	30	20	10W	40-60	30	40-60	30
EHG-62, EHG-68, E-62, E-68	40	30	20	10W	40-60	30	40-60	30
E-31, E-38, E-42, EN	40	30	20	10W	40-60	30	40-60	30
GG, HG	30	30	20W	10W	40-60	30	40-60	30
JOHN DEERE								
A, AN, ANH, AW, AWH	50	30	20W	10W	140	90	—	—
B, BN, BNH, BW, BWH	50	30	20W	10W	140	90	—	—
G, H, HN	50	30	20W	10W	140	90	—	—
AO, AR, BO, BR, D	50	30	20W	10W	140	90	—	—
L, LA	30	30	10W	10W	90	90	90	90
FORD								
All.	30	20	20W	10W	Pace-maker Oil #5	Pace-maker Oil #7	—	—
FORDSON								
All.	40	40	20, 20W	20, 20W	90	90	—	—
INTERNATIONAL "TRAC-TRACTOR"								
T-20	40	30	20	10W	140	90	140	90
T-35, T-40, TA-40, TK-40	40	30	20	10W	140	90	140	90
T-6, T-9	30	30	20W	10W	90	90	90	90
TD-6, TD-9	30	20	10	10W	90	90	90	90
TD-14	30	20	10	10W	90	90	90	90
TD-18	30	20	10	10W	90	90	90	90
TD-35, TD-40	30	20	10	10W	140	90	140	90
MASSEY-HARRIS								
RC (Senior)	30	30, 20	20W	10W	140	90	—	—
S (Senior)	30	30, 20	20W	10W	140	90	—	—
RC, S (Junior)	30	30, 20	20W	10W	140	90	—	—
81, R, C, S	30	20, 20W	10, 10W	10W	140	90	—	—

MAKE AND MODEL	CRANKCASE			TRANSMISSION AND DIFFERENTIAL		FINAL DRIVE		
	Lowest expected atmospheric temperature:							
	Over 90°	+32	+10	Below +10	Above +32	Below +32	Above +32	Below +32
	SAE No.	SAE No.	SAE No.	SAE No.	SAE No.	SAE No.	SAE No.	SAE No.
McCORMICK-DEERING								
A, B.....	30	30	20W	10W	90	90	90	90
F-12, F-14.....	30	30	20W	10W	140*	90**	—	—
F-20, F-30.....	40	30	20	10W	140*	90**	140*	90**
1924, 1932 (All).....	40	30	20	10W	140*	90**	140*	90**
H, M.....	30	30	20W	10W	90	90	—	—
MD.....	30	20	10	10W	90	90	—	—
W-4, O-4, W-6, O-6.....	30	30	20W	10W	90	90	—	—
WD-6.....	30	20	10	10W	90	90	—	—
W-30, 15-30, 22-36, 24-40.....	40	30	20	10W	140*	90**	—	—
10-20, 10-22.....	40	30	20	10W	140*	90**	—	—
MINNEAPOLIS-MOLINE								
GT, RTS, UTS, ZTS.....	30	30	20W	10W	140	90	—	—
RTN, RTU, UTU, ZTN, ZTU.....	30	30	20W	10W	140	90	—	—
OLIVER								
All (Model Row Crop 60).....	30	30	20W	10W	140	90	—	—
All 70 and all 80 Models.....	30	30	20W	10W	140	90	—	—
*Above +40°								
**Below +40°								

WATER AND CALCIUM CHLORIDE SOLUTION TABLE

Note: Put the Calcium Chloride into the water in a container—never pour water over the Chloride. It readily dissolves in cold water and will not injure or clog valves, pump or hose connections.

AMOUNT REQUIRED TO FILL TIRE TO VALVE LEVEL

Tire Size	PART I		PART II			Tire Size	PART I		PART II		
			Safe to 20° Below Zero						Safe to 20° Below Zero		
	Water Only		Use this Amount of CA Cl ₂	Dissolve in this Amount of Water	Total Weight in Tire Lbs.		Water Only		Use this Amount of CA Cl ₂	Dissolve in this Amount of Water	Total Weight in Tire Lbs.
	Lbs.	Gals.					Lbs.	Gals.			
4.00-12	14	1.68	3	1.5	15.8	7.50-20	85	10.2	18.8	9.4	96.2
4.00-15	17	2.04	3.8	1.9	19.3	7.50-22	90	11	20	10.0	105
4.00-18	20	2.40	4.4	2.2	22.7	7.50-24	110	13	24	12.0	125
4.00-19	21	2.50	4.6	2.3	23.8	7.50-40	170	20	36.5	18.25	190
4.00-24	25	3.00	5.4	2.7	28.4						
5.00-12	20	2.4	4.4	2.2	22.7	9.00-10	54	6.5	11.6	5.8	61.3
5.00-15	24	2.88	5.2	2.6	27.2	9.00-16	100	12.0	22	11	113
5.00-16	25	3.0	5.6	2.8	28.4	9.00-24	150	18	33	16.5	170
						9.00-36	220	26	47.5	23.75	245
5.25-21	36	4.33	8.	4.	40.8	9.00-40	240	29	53	26.5	275
5.50-16	36	4.33	8.	4.	40.8	10.00-36	325	39	71.5	35.75	370
						10.00-40	350	42	77	38.5	400
6.00-9	25	3.0	5.5	2.75	28.4	10.00-44	375	45	82.5	41.25	425
6.00-12	33	4.0	7.2	3.6	37.2						
6.00-16	48	5.76	10.6	5.3	54.4	11.25-24	250	30	55	27.5	285
6.00-20	58	6.95	12.8	6.4	65.7	11.25-28	285	34	62.5	31.25	320
6.00-22	60	7	13	6.5	66	11.25-40	380	46	84	42	435
						11.25-42	410				
6.50-16	58	6.95	12.8	6.4	65.7						
						12.75-24	340	41	75	37.5	390
7.00-24	90	11	20	10.0	105	12.75-28	380	46	84	42	435
7.00-40	135	16.2	29.8	14.9	153	12.75-32	420	50	91.5	45.75	475
7.50-10	40	4.8	8.8	4.4	45.3	13.50-24	380	46	84	42	435
7.50-16	75	9.0	16.5	8.25	85	13.50-28	420	50	91.5	45.75	475
7.50-18	80	9.6	17.6	8.8	90.6	13.50-32	460	55	100.5	50.25	520

TRACTOR TIRE INFLATION DATA

WIDE BASE TRACTOR TIRES—FARM OR INDUSTRIAL (REAR OR DRIVING WHEELS ONLY)

PROPER TIRE PRESSURE FOR EACH TIRE SIZE UNDER A GIVEN LOAD									
TIRE SIZE	12	14	16	18	20	22	24	26	28
7-32	900	1010	1110	1210	<u>1300</u>	1400	1490	1580	<u>1670</u>
7-36	995	1070	1170	1280	<u>1380</u>	1490	1580	1670	<u>1770</u>
8-24	980	1100	1210	<u>1325</u>	1430	1520	1610	<u>1710</u>	
8-32	1120	1250	1380	<u>1500</u>	1625	1740	1850	<u>1960</u>	
8-36	1180	1325	1460	<u>1590</u>	1720	1830	1950	<u>2070</u>	
8-38	1220	1360	1500	<u>1640</u>	1770	1880	2000	<u>2120</u>	
9-24	1190	1340	<u>1475</u>	1600	1730	1840	<u>1970</u>		
9-32	1360	1520	<u>1675</u>	1820	1960	2090	<u>2230</u>		
9-36	1430	1600	<u>1770</u>	1930	2080	2220	<u>2360</u>		
9-38	1480	1660	<u>1825</u>	1990	2150	2300	<u>2440</u>		
9-40	1520	1700	<u>1875</u>	2050	2210	2360	<u>2510</u>		
10-24	1425	<u>1600</u>	1760	1920	2070	<u>2210</u>			
10-26	1470	<u>1650</u>	1810	1980	2140	<u>2280</u>			
10-28	1520	<u>1700</u>	1875	2050	2210	<u>2360</u>			
10-36	1710	<u>1920</u>	2120	2310	2490	<u>2650</u>			
10-38	1760	<u>1970</u>	2170	2370	2560	<u>2730</u>			
11-24	<u>1670</u>	1870	2060	2250	<u>2420</u>				
11-26	<u>1725</u>	1930	2130	2320	<u>2500</u>				
11-28	<u>1780</u>	1990	2200	2390	<u>2590</u>				
11-38	<u>2070</u>	2310	2550	2775	<u>2990</u>				
11-40	<u>2120</u>	2370	2620	2850	<u>3080</u>				
12-24	<u>1950</u>	2180	2400	2610	<u>2820</u>				
12-26	<u>2020</u>	2260	2490	2720	<u>2930</u>				
12-30	<u>2140</u>	2400	2650	2890	<u>3120</u>				
12-38	<u>2410</u>	2690	2980	3240	<u>3500</u>				
13-26	2340	2620	2880	3140	<u>3390</u>				
13-30	2480	2780	3070	3340	<u>3610</u>				
13-34	2650	2965	3260	3555	<u>3840</u>				
14-30	2840	3170	3490	3800	<u>4110</u>				
14-34	3020	3380	3720	4050	<u>4375</u>				

*Denotes maximum load for 2 ply tire.

Single underscoring denotes maximum load for 4 ply tire.

Double underscoring denotes maximum load for 6 ply tire.

LOAD AND INFLATION									
TIRE SIZE	12	14	16	18	20	22	24	26	28
6.00-22	670*	730	790	840	<u>900</u>	950	1000	1045	<u>1090</u>
7.50-22	1010*	1100	1190	<u>1280</u>	1360	1435	1510	<u>1590</u>	
7.50-24	1075	1190	1275	<u>1370</u>	1460	1540	1620	<u>1700</u>	
7.50-40	1375	1510	1630	<u>1750</u>	1860	1960	2060	<u>2160</u>	
9.00-24	1520	<u>1670</u>	1800	1930	2040	<u>2150</u>			
9.00-28	1625	<u>1780</u>	1925	2060	2200	<u>2320</u>			
9.00-36	1825	<u>2000</u>	2175	2330	2270	<u>2610</u>			
9.00-40	1925	<u>2120</u>	2300	2460	2620	<u>2760</u>			
10.00-36	<u>2120</u>	2320	2510	2690	<u>2860</u>				
10.00-40	<u>2240</u>	2450	2650	2840	<u>3020</u>				
10.00-44	<u>2360</u>	2590	2800	3000	<u>3190</u>				
11.25-24	<u>2000</u>	2200	2375	2540	<u>2710</u>				
11.25-28	<u>2140</u>	2340	2530	2710	<u>2880</u>				
11.25-36	<u>2410</u>	2630	2840	3050	<u>3240</u>				
11.25-40	<u>2550</u>	2790	3000	3225	<u>3430</u>				
12.75-24	2620	2870	3100	3325	<u>3540</u>				
12.75-28	2800	3060	3300	3540	<u>3760</u>				
12.75-32	2980	3250	3510	3750	<u>4000</u>				
13.50-24	2970	3250	3520	3760	<u>4010</u>				
13.50-28	3170	3460	3740	4010	<u>4275</u>				
13.50-32	3360	3660	3950	4230	<u>4500</u>				



WEIGHTS AND MEASURES OF FARM PRODUCE

POUNDS PER BUSHEL OR GALLON

Commodity	Measure*	Net Wt. Lbs.
Alfalfa seed	bu.	60
Apples	bu.	48
	bbl.	140
Barley	bu.	48
Beans:		
Lima, dry	bu.	56
Other, dry	bu.	60
	sack	100
Lima, unshelled	bu.	32
Snap	bu.	30
Bluegrass seed	bu.	14-30
Buckwheat	bu.	48-52
Butter	tub	63
Cabbage	1½ bu. hamp.	50
Carrots:		
Without tops	bu.	50
Clover seed	bu.	60
Corn:		
Ear, husked	bu.	70
Shelled	bu.	56
Green, sweet	bu.	35
Meal	bu.	50
Oil	gal.	Av. 7.5
Sirup	gal.	11.5
Cowpeas	bu.	60
Cream, 30 per cent		
butterfat	gal.	8.43
Eggs, average size	case, 30 doz.	45
Flaxseed	bu.	56
Flour, various	bbl.	196
Grain sorghums	bu.	56 & 50
Hempseed	bu.	44
Honey	gal.	12
Hungarian millet seed	bu.	48 & 50
Kafir	bu.	56 & 50
Linseed oil	gal.	Av. 7.5
Malt	bu.	34
Maple sirup	gal.	11
Milk (specific gravity 1.032)	gal.	8.6
Millet	bu.	48-50
Molasses	gal.	11.75
Oats	bu.	32
Onions, dry	sack	100
	sack	50
	bu. late	57
	bu. early	50
Onions, green, bunched	crate	50-55
Onion sets	bu.	28-32
Orchard grass seed	bu.	14
Pears	bu.	50
Peas:		
Green, unshelled	bu.	30
Dry	bu.	60
Perilla seed	bu.	37-40

POUNDS PER BUSHEL OR GALLON

Commodity	Measure*	Net Wt. Lbs.
Popcorn:		
On ear	bu.	70
Shelled	bu.	56
Potatoes	bu.	60
	bbl.	165
Rapeseed	bu.	50 & 60
Redtop seed	bu.	14-40
Rice:		
Rough	bu.	45
	bag	100
	bbl.	162
Milled	pock. or bag	100
Rye	bu.	56
Sorgo:		
Seed	bu.	50
Sirup	gal.	11.4
Soybeans	bu.	60
Soybean oil	gal.	7.5
Spelt	bu.	40
Sudan grass seed	bu.	40
Sugarcane sirup	gal.	11.25
Sunflower seed	bu.	24 & 32
Sweet potatoes	bu.	55
Timothy seed	bu.	45
Turpentine	gal.	7.23
Velvetbeans (hulled)	bu.	60
Vetch	bu.	60
Water, 60° F.	gal.	8.33
Wheat	bu.	60

*Measure Abbreviations Used.
Barrel—bbl., Bushel—bu., Gallon—gal., Hamper—hamp., Pocket—pock.

NOTE: Standard U.S. bushel contains 2,150.42 cubic inches figuring on a bushel basket level full. Large sized products sometimes sold on a heaped bushel basis and in this case would exceed 2,150.42 cubic inches. The U.S. gallon has 231 cubic inches; standard fruit barrel, 7,056 cubic inches.

TABLE OF EQUIVALENTS

Commodity	Measure	Equivalent
Beans, lima	1 lb. shelled	2 lbs. unshelled
Buckwh't Flour	1 bbl. (196 lbs.)	7 bu. buckwheat
Corn, shelled	1 bu. (56 lbs.)	2 bu. (70 lbs.) of husked ear corn
Cotton	1 lb. ginned	2.86 lbs. unginned
Dairy Products:		
Butter	1 lb.	21 lbs. milk
Cheese	1 lb.	10 lbs. milk
Cond. milk whole	1 lb.	2.2 lbs. milk
Evap. milk whole	1 lb.	2.2 lbs. milk
Ice cream	1 gal.	15 lbs. milk
Malted milk	1 lb.	2.6 lbs. milk
Powdered milk	1 lb.	8 lbs. milk
Powdered cream	1 lb.	19 lbs. milk

TO ESTIMATE QUANTITIES OF HAY AND GRAIN

Bushels of Shelled Corn in Bin

To determine the amount of shelled corn in a bin, multiply the length of the bin by the width of the bin by the depth of the corn. Figure all of it in feet and divide by 1¼. Figure grain the same way.

Bushels of Ear Corn in a Crib

Figuring in feet, multiply the length by the width by the average depth. Then multiply by 2/5. If crib is round, multiply the distance around by the diameter by the average depth of the corn and then divide by 10.

Tons of Hay in a Mow

Multiply the length by the width by the average height, all in feet, and divide by 400 to 500, depending upon the kind of hay and how long it has been in the mow.

Tons of Hay in a Stack

Figure the overthrow (the distance from the ground on one side, over the stack and to the ground on the other side). Multiply the overthrow by the length by the width, all in feet, and then multiply by 3, divide by 10 and then divide by 500 or 600.

TO ESTIMATE CORDS OF WOOD IN A PILE

To determine the number of cords of wood in a pile, multiply the length by the height by the width. Divide the product by 128.



FINDING HEIGHT OF TREE OR BUILDING

Drive a pole into the ground. Then measure the distance from the ground to the top of the pole. When the shadow cast by the pole is equal to the pole's height from the ground, the height of buildings or trees will also be equal to the length of the shadows they cast.



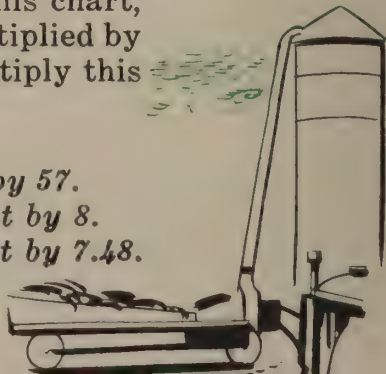
TO FIND THE CAPACITIES OF ROUND TANKS AND SILOS
Chart shows capacities in cubic feet of silos, round tanks and round bins

Table with 21 columns (Diam. in Ft. to 20) and 21 rows (5 to 20). It lists capacities in cubic feet for round tanks and silos at various diameters and depths.

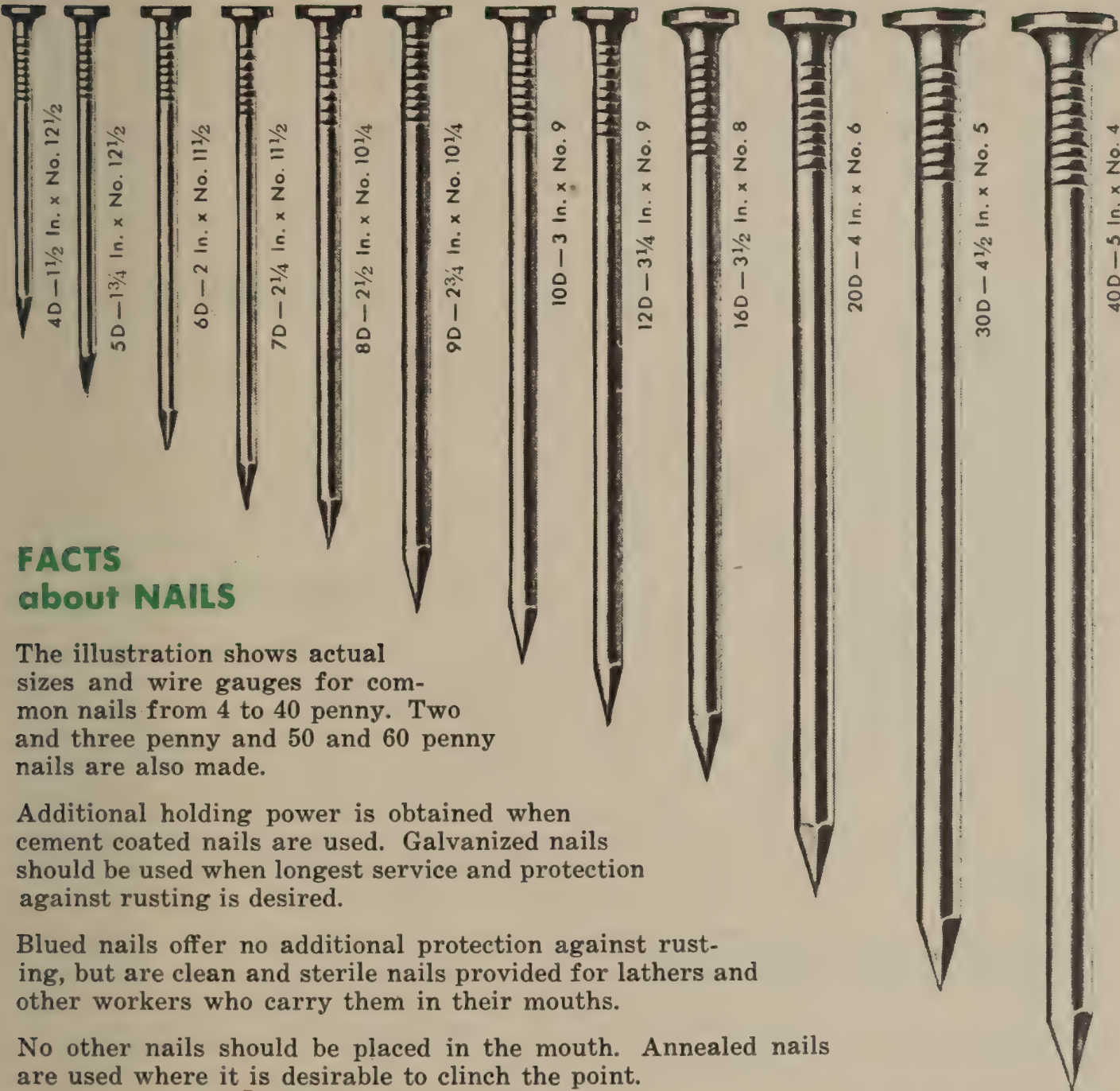
This table gives the capacity of round tanks in cubic feet. If you wish to determine cubic feet of cylindrical tanks not covered in this chart, multiply the square of the diameter (the distance across multiplied by itself) by .7854. This gives you the area of the bottom. Multiply this figure by the height to find the cubic content.

To Determine

- Capacity in TONS OF SILAGE.....Divide the cubic feet by 57.
- Capacity in BUSHELS OF GRAIN..Multiply the cubic feet by 8.
- Capacity in GALLONS.....Multiply the cubic feet by 7.48.



SIZE, LENGTH AND WEIGHT OF WIRE NAILS



FACTS about NAILS

The illustration shows actual sizes and wire gauges for common nails from 4 to 40 penny. Two and three penny and 50 and 60 penny nails are also made.

Additional holding power is obtained when cement coated nails are used. Galvanized nails should be used when longest service and protection against rusting is desired.

Blued nails offer no additional protection against rusting, but are clean and sterile nails provided for lathers and other workers who carry them in their mouths.

No other nails should be placed in the mouth. Annealed nails are used where it is desirable to clinch the point.

LUMBER MEASURE

Many times you will have to determine the contents of boards in square feet. This is the way to do it. Multiply the length of a board in feet by the width of the board in inches . . . then divide the product by 12. Here's the way. You have a board that is 9 inches wide and 16 feet long:

$9 \times 16 = 144 \div 12 = 12 \text{ sq. feet.}$

To determine the square feet in scantlings, joists, etc., multiply the length, thickness and width together and divide the product by 12. Here's an example: We are to find the contents of an 18 foot joist, 2 x 8.

$2 \times 8 \times 18 = 288 \div 12 = 24 \text{ sq. ft.}$

To find the number of board feet in a log, subtract 4 inches from the diameter and square the remainder. The answer will be the number of board feet in a 16 foot log. Add 1/8 for 18 foot logs and 1/4 for 20 foot logs. Subtract 1/8 for 14 foot logs and 1/4 for 12 foot logs.

WEIGHTS OF STRUCTURAL MATERIALS

(Pounds per Cubic Foot)

Material	Weight
Common Brick.....	125
Cement	94
Coal (Soft Lump)	54
Concrete	150
Cypress	29
Douglas Fir	30
Earth (rammed)	100
Gravel	120
Hemlock	28
Lime	53
Limestone	164
Oak, red	44
Oak, white	47
Pine, yellow	36
Sand	100
Water	62.4

MEASURES OF LENGTH

- 1 hand equals 4 inches
- 1 link equals 7.92 inches
- 1 span equals 9 inches
- 1 foot equals 12 inches
- 1 foot equals .3 of a meter
- 1 cubit equals 18 inches
- 1 yard equals 3 feet
- 1 yard equals .9 of a meter
- 1 rod equals 1 pole
- 1 rod equals 5½ yards
- 1 rod equals 16½ feet
- 1 rod equals 5 meters
- 1 pole equals 5½ yards
- 1 pole equals 16½ feet
- 1 chain equals 4 rods
- 1 furlong equals 40 poles
- 1 mile equals 5,280 feet
- 1 mile equals 8 furlongs
- 1 mile equals 1760 yards
- 1 mile equals 7½ cable lengths
- 1 knot equals 1-1/6 miles
- 1 league equals 3 miles
- 1 degree equals 69⅓ miles
- 1 degree equals 60 geographic miles



SURVEYOR'S MEASURE

- 7.92 Inches1 Link
- 25 Links1 Rod
- 100 Links1 Chain
- 80 Chains1 Mile
- Gunter's Chain is the unit and is 66 feet long.
- 10,000 Square Links 1 Sq. Chain
- 10 Square Chains 1 Acre
- 10 Chains Square.....10 Acres



DRY MEASURE

- 2 Pints1 Quart
- 8 Quarts1 Peck
- 4 Pecks1 Bushel
- 1 Bushel contains 2150.42 cubic inches or approximately 1¼ cubic feet.

LIQUID MEASURE

- 4 Gills1 Pint
- 2 Pints1 Quart
- 4 Quarts1 Gallon
- 1 Gallon contains 231 cubic inches.
- 1 Cubic Ft. equals 7½ gallons.



CUBIC MEASURE

- 1728 Cubic Inches1 Cubic Ft.
- 27 Cubic Feet.....1 Cubic Yd.
- 128 Cubic Feet.....1 Cord



U. S. LAND MEASURE

- 640 acres.....1 section
- 1 section.....1 square mile
- 36 sections1 township
- 160 acres..... 1 quarter section
- An acre contains 4,840 square yards or 43,560 square feet. A square acre measures 208.71 feet on each side.



CIRCLES AND GLOBES

- To find the circumference of a circle, multiply the diameter by 3.1416
- To find the area of a circle, multiply the square of the diameter by .7854.
- To find the surface of a globe, multiply the square of the diameter by 3.1416.
- To find the solidity of a globe, multiply the cube of the diameter by .5236.



APOTHECARY'S WEIGHT

- 20 Grains1 scruple
- 3 Scruples1 dram
- 8 Drams1 ounce
- 12 Ounces1 pound

GUIDE TO PROPER LUBRICATION OF FARM MACHINERY

GEARS

EXPOSED—Coat with Cities Service Cisco Compound No. 0 or No. 1, depending on season, (applied hot), if operating under normal conditions. These are tacky lubricants which adhere to gear teeth. In very dusty atmospheres use Cities Service or Koolmotor Gear Oil SAE No. 140.

ENCLOSED—Where housing is oil-tight, use Cities Service or Koolmotor Gear Oil SAE No. 140 in Summer, or SAE No. 90 in Winter. If housing is not adequately sealed and leakage occurs, use Cities Service or Koolmotor Gear Oil SAE No. 250 in Summer, and keep level of oil below point of leakage.

CHAINS

ROLLER TYPE, EXPOSED—Penetration of lubricant between pins and rollers is important. Lubricate with Cities Service or Koolmotor Motor Oil SAE No. 30 or No. 20, depending on atmospheric and operating conditions. Best results can be obtained by removing chains periodically and cleaning thoroughly in solvent. Dry and soak in warm Cities Service or Koolmotor Gear Oil SAE No. 140.

ROLLER OR SILENT TYPES, ENCLOSED—Use Cities Service or Koolmotor Motor Oil SAE No. 20. Correct lubricant depends upon parts housed with the chain.

MALLEABLE IRON OR STAMPED STEEL TYPE—Where operating conditions permit, brush with Cities Service or Koolmotor Gear Oil SAE No. 140. If dirt or other matter is likely to stick to chain and impair operation, these chains should run dry.

When chains are not in use for a considerable period of time, coat them with Cities Service Anti-Corrode to prevent rust.

WIRE CABLES

Cables need lubrication between the strands and not merely a coating on the outside. Clean with Cities Service Penetrating Oil, heat and apply Cisco Compound No. 0 or No. 1, depending on the season. If cable is to be used in very dusty atmospheres a treatment with the Penetrating Oil alone often will prove sufficient to keep the cable free of dust accumulations. When cables are to be left idle they require protection against rust. Use Cities Service Anti-Corrode.

CITIES SERVICE LUBRICATION CHART FOR GENERAL FARM MACHINERY

KEY TO CODE SYMBOLS								
CODE Symbol	Cities Service Brand	CODE Symbol	Cities Service Brand					
MO	Cities Service or Koolmotor Motor Oils	TM	Trojan Grease Type "M"					
GO	Cities Service or Koolmotor Gear Oils	CC	Cisco Compounds					
EPO	Cities Service E.P. or Koolmotor AP Gear Oils	TW	Trojan Grease Type "W"					
TA	Trojan Grease Type "A"	(Number following symbol in chart indicates grade)						

UNIT	PART	Oil Cup or Oil Hole	Grease Cup, Plug or Hand Packed	Pressure Fitting or Plug	Hand Oiling	Bath Lubrication	Mechanical Lubricator	Circulating System
Binders, Blowers.....	BEARINGS— Plain or Roller..... Ball.....	MO-30	TA-2	TA-1	MO-30	MO-30	MO-30	
Combines.....		MO-30	TM-3	TM-2	MO-30	MO-30	MO-30	
Cultivators.....								
Drills, Harrows.....								
Ensilage Cutters.....								
Bailers.....	GEARS— Exposed to sand and grit; low to soil..... Exposed but well above soil..... Gears (enclosed).....				GO-140			
Grinding Mills.....								
Elevators.....								
Potato Diggers.....								
Power Mowers.....								
Seeders, Spreaders.....	CHAINS (enclosed).....				CC-1			
Plows, Reapers.....						GO-140		
Loaders, Power Saws, Threshers, etc.....		CHAINS (exposed).....					MO-20	MO-20
LIGHTING UNITS.....								
UNIVERSAL JOINTS.....			TA-1	EPO-90				
POWER UNITS.....		(For engines see manufacturer's recommendation)						
ELECTRIC MOTORS & GENERATORS.....		MO-20	TM-2		MO-20			
PUMPS:								
Gears (exposed).....					CC-1			
Gears (enclosed).....						GO-140		
Bearings.....		MO-30	TA-2	TA-1		MO-20		
Packing Glands.....			TW-5	TW-5				
MILKING MACHINES.....		MO-10	TM-2	TM-2	MO-10			
CREAM SEPARATORS.....		MO-10	TM-2	TM-2	MO-10	MO-10		

Notes: Recommendations are for average summer conditions.
For winter use or for special conditions see your nearest Cities Service representative.
Cisco Compounds should be applied hot.
Apply Cities Service Anti-Corrode on parts liable to rust when not in use.

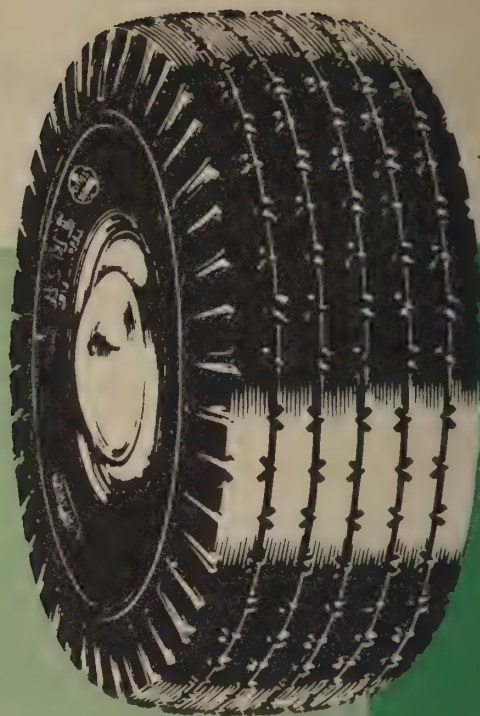
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INVEST IN THE BEST

ACME QUALITY GIVES YOU LONGER TIRE LIFE



Acme's deep tread means longer wear. Note, too, the protective "toes" . . . to kick out sharp, cutting stones that otherwise might lodge in the grooves and damage the rubber. Every Milemaster has a modern tread designed to reduce heat and wear due to friction. Heat resistance gives extra mileage at lower cost.

A WORN OUT BATTERY WASTES TIME

An Acme **HEAVY DUTY** battery answers the most rigorous demands of car, truck and tractor. No matter what the weather may be, this battery, due to its tremendous reserve, will insure quick starting on the coldest day of Winter.

**Ask for a Free Battery Inspection
at your**

**CITIES SERVICE
DEALER'S**



AVERAGE COSTS OF USING FARM MACHINERY

Machine	1	2	3	4	5	6	7
	Cost new	Average life in years	Repairs as per cent of cost new	Annual cost		Cost per day {when}	Days used per year
				Total	Per cent of cost new		
Tractor plow (2-16").....	\$135.00	18	3.0	\$17.22	12.8	\$1.15	15
Tractor plow (3-16").....	170.00	18	3.0	21.64	12.8	1.45	15
Disk harrow (15' single).....	145.00	18	1.0	16.85	11.6	1.40	12
Spike-tooth harrow.....	45.00	20	1.5	4.45	9.9	.45	10
Field cultivator.....	140.00	15	1.5	18.51	13.2	1.30	14
Tractor cultivator, 2-row.....	110.00	16	2.0	13.37	12.1	.90	15
Tractor cultivator, 4-row.....	240.00	16	2.0	28.75	12.0	2.90	10
Grain drill tractor hitch, 10'....	240.00	20	0.5	22.56	9.4	3.75	6
Corn planter, 2-row.....	85.00	18	1.5	9.62	11.3	1.60	6
Mower, 6'.....	95.00	18	3.0	12.17	12.8	1.20	10
Side delivery rake.....	125.00	18	1.0	15.85	12.7	2.65	6
Hay loader.....	140.00	18	1.0	14.94	10.7	1.85	8
Grain binder (tractor).....	340.00	18	1.5	38.28	11.3	4.80	8
Corn binder, 1-row (tractor)...	340.00	18	1.0	35.02	10.3	5.85	6
Combine (6' auxiliary motor)...	900.00	10	2.0	138.31	15.4	9.25	15
Corn picker, 2-row.....	700.00	12	1.0	89.65	12.8	7.50	12
Ensilage cutter.....	325.00	15	2.0	39.88	12.3	5.70	7
Manure spreader.....	160.00	16	1.5	20.12	12.6	.80	25

(University of Minn. Extension Service U. S. Dept. of Agriculture)

HOW TO USE ABOVE TABLE

- For approximate cost of using a machine for a day, use the figures in column 6.
- If the "cost new" of your machine is different from the one given in column 1, multiply the cost new by the percentage figure in column 5. Since this gives the annual cost, divide the number of days your machine is used per year for the cost per day.

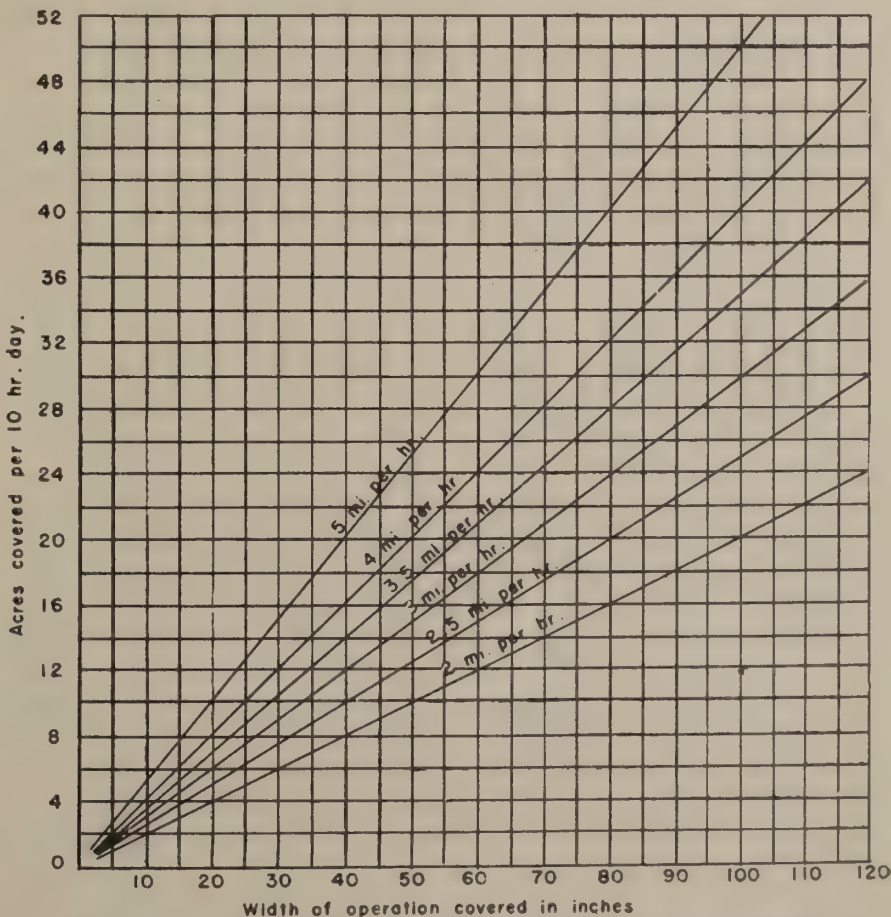
DAILY CAPACITY OF FARM MACHINES

The amount of work accomplished by an individual machine depends upon its width, speed of travel, and period of operation.

The chart on this page provides a means of calculating approximate acreages covered during a ten-hour day.

Along the bottom of the chart is listed the width of the implement in inches, and along the left side, the acres covered in a ten-hour day. Here is an example of how to use the chart: If a mower cuts a 60-inch swath at the rate of three miles per hour, follow the vertical line marked "60" upward until it meets the diagonal line marked "3 miles per hour." From this point, follow the horizontal line to the left and you will find that it will cut 18 acres in a ten-hour day. If the machine is wider than 10 feet, use one-half of the width and multiply the answer by two.

This chart is made to show the amount of land covered in a ten-hour day. If longer or shorter hours are desired, the results may be obtained by the formula: width in inches x miles per hour x hours traveled divided by 100. This will give the acres covered. To compensate for turning, etc., the following formula is sometimes used: width in feet x miles per hour = acres covered in 10-hour day.



The chart shown above indicates the average amount of land which can be covered normally in a 10-hour day. It will be helpful in figuring out a work schedule for farm machines. For details of how to use it, see instructions at left.

IMPLEMENT TIRE INFLATION DATA

PROPER TIRE PRESSURE FOR EACH TIRE SIZE UNDER A GIVEN LOAD										
For General Farm Implement Service. Max. Speed 20 Miles Per Hour										
TIRE SIZE	20	24	28	32	36	40	44	48	52	56
3 00-7	175	**195	215	230	* 245	260	<u>275</u>			
3 50-12	325	370	410	450	485	<u>520</u>				
4 00-7	300	340	370	400	<u>430</u>					
4 00-8	330	370	405	440	<u>470</u>					
4 00-9	360	400	440	475	<u>510</u>					
4 00-12	450	500	550	595	<u>635</u>	675	710	<u>775</u>		
4 00-15	**520	575	630	675	<u>730</u>					
4 00-18	**585	650	710	770	<u>825</u>					
4 00-24	630	700	770	830	<u>890</u>					
4 00-30	665	735	810	875	<u>935</u>					
4 00-36	700	775	850	920	<u>985</u>	1045	1105	<u>1160</u>		
5 00-12	620	690	755	<u>815</u>						
5 00-15	690	765	840	<u>910</u>						
5 00 16	730	810	885	<u>960</u>						
5 00 21	805	895	980	<u>1060</u>						
5 00 36	950	1050	1150	<u>1240</u>	1330	1410	<u>1490</u>			
5 00-40	1010	1125	1230	<u>1330</u>	1430	1520	<u>1600</u>			
5 25-21	890	1000	1090	<u>1180</u>						
5 50-16	865	965	1060	<u>1140</u>	1220	1300	<u>1370</u>			
6 00-9	700	775	<u>850</u>	920	985	<u>1045</u>				
6 00 12	820	915	<u>1000</u>							
6 00-16	1020	1130	<u>1240</u>	1340	1430	<u>1520</u>				
6 00-20	1090	1210	<u>1330</u>	1440	1540	<u>1640</u>				
6 50-16	1160	1290	<u>1410</u>	1530	1640	<u>1740</u>				
6 50-24	1330	1480	<u>1620</u>	1750	1870	<u>1990</u>				
6 50-36	1470	1640	<u>1790</u>	1940	2080	<u>2200</u>				
7 00 16	1330	1480	<u>1620</u>	1750	1880	<u>1990</u>				
7 50-10	1120	<u>1250</u>	1370	1480	<u>1580</u>					
7 50 16	1500	<u>1670</u>	1820	1970	<u>2110</u>					
7 50 18	1550	<u>1720</u>	1880	2040	<u>2190</u>					
7 50 20	1600	<u>1780</u>								
7 50 22	1655	<u>1840</u>								
7 50-24	1740	<u>1940</u>	2110	2290	<u>2460</u>					
7 50-28	1800	<u>2010</u>	2200	2380	<u>2550</u>	2720	2890	<u>3050</u>		
7 50 36	1930	<u>2150</u>	2350	2540	<u>2720</u>					
7 50-40	2015	<u>2240</u>								
8 25 24	2100	<u>2340</u>								
9 00 10	<u>1390</u>	1550	1700	<u>1830</u>						
9 00 16	1850	2060	2250	<u>2440</u>	2620	2780	<u>2940</u>	3090	3240	<u>3390</u>
9 00 24	2470	2750	3010	<u>3250</u>	3480	3710	<u>3920</u>			
9 00 36	<u>2740</u>	3060	3350	<u>3620</u>	3880	4120	<u>4360</u>	4590	4820	<u>5040</u>
9 00-40	2950	3170	3470	<u>3750</u>	4010	4260	<u>4520</u>	4750	4980	<u>5210</u>
11 25 24	3260	3630	<u>3960</u>	4270	<u>4520</u>					
11 25 28	3370	3760	<u>4120</u>	4450	<u>4770</u>					
11 25 36	3610	4030	<u>4400</u>	4720	<u>5040</u>	5430	<u>5750</u>			
12 75-28	4410	4920	5380	<u>5810</u>	6210	<u>6580</u>				
12 75 32	4660	<u>5090</u>	5560	<u>6010</u>	6420	<u>6800</u>				

**Denotes maximum load for 2 ply tire.
 Single underscoring denotes maximum load for 4 ply tire.
 Double underscoring denotes maximum load for 6 ply tire.
 Triple underscoring denotes maximum load for 8 ply tire.
 Dotted underscoring denotes maximum load for 10 ply tire.

ADJUSTMENT AND REPAIR OF MOWING MACHINES

Under average operating conditions probably no other farm machine will yield as great a return for proper care, adjustment and repair as will the mower. The life will be increased, the draft materially reduced and the quality of work considerably improved by good maintenance. Adjustments and repairs are easily made, and the cost is relatively small.

The cutter bar assembly, including the

knife, guards, guard plates, wearing plates and knife clips, is the heart of the mower. The cutting action may be compared to an ordinary pair of shears of which the knife sections are one blade and the guard plates form the other, with the wearing plates and the knife clips holding the two parts together so that a shear cut is assured. Cutting troubles are usually located in the cutter bar assembly.

SAFEGUARD AGAINST RUST

It will pay you to protect your machinery against RUST on both the outside and inside by the use of special Cities Service Anti-Corrode products, especially designed for this purpose—just as it pays to lubricate for protection on the inside against WEAR.

These reliable products—in easy-to-use liquid form—will help guard your equipment against rust and corrosion. Made in different grades for specific farm purposes, they provide a tough, durable film that holds up against the ravages of weather and other conditions that normally cause rust and corrosion. Although tough, they can be removed with kerosene.

Anti-Corrode May Be Sprayed On

Anti-Corrode may be sprayed on machinery with an ordinary garden sprayer or hand sprayer or “painted” on with an ordinary paint brush. These speedy methods of application make rust prevention an easy job. Always keep Anti-Corrode handy—you will find many uses for it.

Positive Rust Removing

If your machinery already has been attacked by rust, you can remove it with Cities Service Rust Remover. This reliable, easy-to-use product can be applied with a stiff brush or cloth. Small articles may be immersed in it, but use a glass, crock, wood or rubber-lined container. It is odorless and non-inflammable. Rust, if not removed before repainting, will spread under the newly painted surface

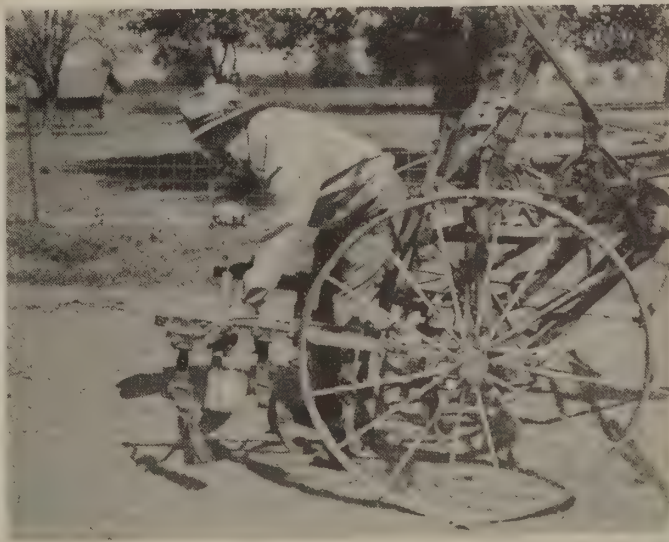


Protecting mower cutter bar and sickle against rust by applying Anti-Corrode, a liquid that covers surfaces with a thin, tough coating. It can be applied easily with a brush as shown.

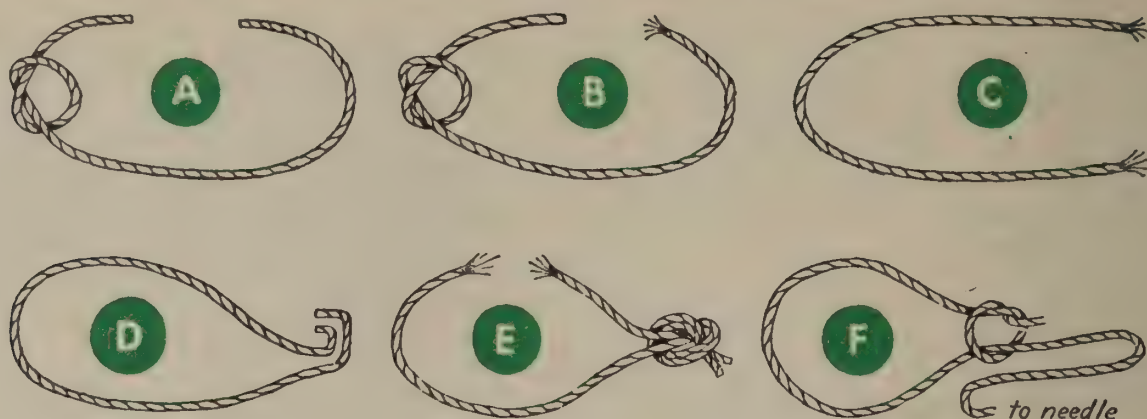
and soon destroy it. So before repainting steel or iron surfaces, take time to remove the rust.

Guard Against Weather

To lengthen machinery life, it is a good practice to keep all wooden and non-operating parts painted. It adds to the appearance of the equipment; gives your hired help extra pride in using it, and this promotes better care by them. It pays to take time to sand off old paint enough to smooth the surface before repainting. You'll profit by making machinery repainting part of your “Fall Check-up” of equipment—and you'll start the new season with your equipment in ship-shape and “ready to roll” during the busy Spring and Summer days.



LOCATING GRAIN BINDER KNOTTER TROUBLES



Binder knotter troubles often can be diagnosed by studying the mis-knotted or unknotted twine. The diagrams above and explanation below furnish the key to many knotter troubles. Remember, if knotter bills are rusted or covered with paint, polish them with emery cloth. Be sure to make all of your adjustments gradually until the trouble is remedied.

A—If twine is found clinging to knotter hook or bills with both ends cut off square, twine disc is too loose or twine tension too tight. If loosening tension or tightening disc spring does not correct trouble, examine disc for wear—it may need replacing. Check to make sure the twine is stretched tightly across the bills.

B—If broken twine is found on bills with free end ragged or crushed, loosen twine tension. If this doesn't work, loosen spring disc slightly. Check disc for proper timing.

C—If twine is found with the bundle and with both ends straight and free from knots but both ragged and crushed, the

tension is right but the disc spring is very tight. Loosen the disc spring gradually.

D—When twine is with bundle, with ends folded showing the knot was formed but not completed, examine bills. Look for foreign material under upper knotter bill and in groove of lower bill. The bill spring may be too loose or the hook or bills badly worn. Tighten the knotter bill or tighten the hook spring if it is loose.

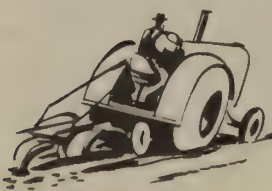
E—When broken twine is found on bundle or on bills with knot perfectly formed, bill spring may be too tight for tying loose bundles. Loosen spring or set binder head for larger bundles. Check also for worn cam roller on stripper arm, bent stripper arm and loose twine tension.

F—If twine has a slip noose and is extended from the discharged bundle to the needle eye, needle has failed to place twine in disc holder either because it is bent or because of excessive wear in needle eye. If needle eye does not have a special wearing piece, the remedy is to get a new needle.

PLOWING VS. DISCING

Listed below are a number of magazine articles that discuss both sides of the controversy of plowing versus discing. Your nearest library will get them for you. *Abolition of the Plow*, H. H. Bennett, New Republic, 109:453-4, O 4 '43. *Plowman's Folly*, E. H. Faulkner, D 161 p., \$2, '43, Univ. of Oklahoma Press. Also, *Nature Mag.* 36:439 O '43; *Science Digest*, 14:11-12 N '43; *Soil Science*, 56:394 N '43. *Evangelist of Plowman's Folly*, L. Bromfield, *Reader's Digest* 43: 35-9, D '43. *To Plow or Not to Plow*, *Fertilizer Review*, 18:4-5, Jl. 43. *Why Do Farmers Plow?* W. A. Albrecht. Maps, diags, graphs. Better

Crops, 27:23-6 Je. '43 and 27:15-20 Ag. '43. *Farmers Are Plowing Again*, *Fertilizer Review*, 19:3, Ja. '44. *Plow—Friend or Foe?* F. E. Bear and S. Epstein, N. J. Ag. 26:6-7, Mr. '44. *Plowman's Wisdom*, L. Haystead, *Fortune*, 29:22, F '44. *Should We Plow?* *Bus. Wk.*, p. 72, N 27 '43. *Swords to Ploughshares—or Disc Harrows*, J. G. Esson, *Gard. Chron. Am.* 48:10 Ja. '44. *Present Status of the Plow*, R. A. Norton and others, *Ag. Eng.* 25:7-10, Ja. '44. *Crop Yields as Related to Depth of Plowing*, A. N. Hume, S. D. Ag. Exp. Bul., 369:1-6, '43. *Twilight of the Plow?* R. I. Throckmorton, *Country Gentleman*, 113:12-13, Mr. '43.



BELTS AND PULLEYS

Figuring Belt Speed

To figure the belt speed in feet per minute, multiply the diameter of the pulley in inches by .2618. This gives the circumference of the pulley in feet and this multiplied by the revolutions per minute will give you the belt speed in feet.

Horsepower Belt Transmits

To find the horsepower that a belt will transmit, multiply the width of the belt in inches by its speed in feet and divide the result by 800. The final result will be the horsepower for a four-ply belt. For a six-ply belt, divide by 600; for an eight-ply belt, divide by 400; for a ten-ply belt, divide by 350.

Determining Belt Length

To determine the length of a belt, add the diameter of the two pulleys together, divide the sum by 2 and multiply the result by 3.1416. Add this result to twice the distance between the centers of the shafts and you have the length of belt required for the job.

Relative Transmission of Horsepower

To determine the relative transmission of horsepower for a given speed, remember the horsepower is directly in proportion to the width of the belt. For example, four-ply belt, 16 inches wide running at a certain speed, will give eight times as much power as a four-ply belt, 2 inches wide, running at the same speed. Direct proportions hold true in regard to all belt widths of the same thickness running at the same speed.

Calculating Speed and Diameter of Pulleys

To determine the speed and diameter of driving pulleys, remember the product of the diameter and the speed of the driving pulleys equals the product of the diameter and the speed of the driven pulley. Thus, if the speed and the diameter of the driving pulley are given, multiply them together and divide by the diameter of the driven pulley to find the speed of

the driven pulley; or if the speed is known, divide by the speed of the driven pulley to find its diameter.

Let us take, for example, a tractor pulley $9\frac{1}{2}$ inches in diameter, running at 1,000 R.P.M. We have to determine the size of pulley we need on a thresher cylinder shaft to be run at 1,100 R.P.M.

$9\frac{1}{2}$ times 1,000 equals 9,500, which, divided by 1,100 equals 8.64. Since pulleys are made in standard diameters, use the next larger size—which would be a 9 inch in this case—and raise the engine speed slightly. Or, as an alternate, use an $8\frac{1}{2}$ inch pulley on the thresher shaft, considering that the slippage of the belt will reduce the effective speed to about the correct number of revolutions per minute.

Determining Required Ply

To determine the required ply of a belt of given width to deliver a given horsepower is not difficult. Multiply the given horsepower by 800. Then multiply the given width in inches by the given belt speed in feet. Divide the first result by the second.

If the quotient is 1 or nearly 1, a four-ply belt is required. If the quotient is $1\frac{1}{2}$, a six-ply belt is required; if the quotient is $1\frac{3}{4}$ to 2, an 8-ply belt is required; if 2 to $2\frac{1}{4}$, a 10-ply belt is required.

Determining Belt Width

Here's the way to find the width of a belt required for a specific job. To find the width of a four-ply belt required economically to transmit a given horsepower at a given belt speed per minute, multiply the given horsepower by 800 and divide the result by the given belt speed.

To find the width of a six-ply belt required when the horsepower and speed are known, multiply the horsepower by 600 and divide the result by the belt speed.

To find the width of an eight-ply belt required when the horsepower and speed are known, multiply the horsepower by 400 and divide the result of the belt speed.

To find the width of a ten-ply belt required when the horsepower and speed are known, multiply the horsepower by 350 and divide the result by the belt speed.

CORRECTING FARM IMPLEMENT TROUBLES

MANURE SPREADER

TROUBLE	CAUSE	REMEDY
1. Breakage on Conveyor Chain, Sprockets or Feed Gear.	Loaded too high.	Do not load so that manure wedges under gauge bar.
	Feed engaged when turning.	Always disengage feed when turning around in the field.
	Feed ratchet teeth filled with dirt.	Clean out ratchet teeth. This allows drive pawls to seat properly and prevents chipping out ratchet teeth or pawls.
2. Spread Too Narrow.	Lack of proper speed.	Drive team at steady speed of $2\frac{1}{2}$ mi. per hr. On tractor spreaders run 4 to 5 mi. per hr.
	Shallow load.	Put on well-rounded load to depth of gauge bar.
	Lack of bedding in manure.	Without bedding, manure does not have enough body for beater teeth to deliver sufficient volume to widespread.

PLOW

TROUBLE	CAUSE	REMEDY
1. Poor Penetration—Depth of Plowing Not Uniform.	Dull or worn shares.	Resharpen shares. Replace if too badly worn.
	Rolling coulters dull or set too deep.	Resharpen dull coulter blades. Raise coulter to highest position for satisfactory work.
	Hitch adjusted too high on clevis jaws.	Lower hitch on clevis jaw adjustment.
2. Ridging in the Plowed Land.	Plow not level.	Level plow until all bottoms work at uniform depth.
	Width of cut on all bottoms not uniform.	Adjust hitch until front bottom cuts correct width.
	Plow not pulling straight behind tractor.	Adjust hitch until wheels of plow run parallel with line of travel.
	Shares of bottoms not of equal sharpness.	Sharpen dull shares and replace worn ones.

DISK HARROW

TROUBLE	CAUSE	REMEDY
1. Rear Gangs Run to One Side More Than the Other.	Rear gangs not running level.	Adjust rear gang leveling device so that the inner and outer ends of rear gangs run at same depth.
	Bearings in one rear gang too tight.	Loosen up bearings and grease well.
	Scrapers on one rear gang too tight.	Adjust scrapers the same on both rear gangs.
2. Rear Gangs Do Not Cover Center Strip Left by Front Gangs.	Harrow pulled too slowly.	Increasing speed causes disks to cover better.
	Not enough angle in rear gangs.	Increase angle to maximum.
	Inner ends of front gangs cut too deep.	Adjust front gangs to cut shallower at inner ends, leaving more dirt for rear gangs to throw in.
	Rear gangs too close together.	Adjust rear gangs farther apart to get away from furrows made by front gangs.



HANDY HOME HINTS



A handy kneeling pad for scrubbing is a folded towel inserted in a paper bag. The bag can be discarded after each use and the pad will remain clean.

*Mrs. Oscar Warmark,
Devils Lake, N. D.*

Children's paper picture books will last much longer if you coat each page with clear shellac. This prevents tearing and is more sanitary, as the pages may be cleaned with a damp cloth.

Miss Phyllis Kruger, Kiester, Minn.

If sewing machine needles become blunt, sew them through fine sandpaper a few times.

Mrs. Mabel Surber, Lynchburg, O.

The corner cut from an envelope and pierced at the point makes a convenient funnel for filling salt and pepper shakers.

*Irene J. Dobry,
Chicago, Ill.*



As a quick substitute for frosting on a cake, lay a chocolate bar on the cake and return it to the oven to melt. The softened bar can then be spread easily and makes a delicious topping.

Mrs. Thelma McGinn, Cadillac, Mich.

Kerosene and baking soda very effectively clean grease and grime from the bath tub and lavatory.

Mrs. O. B. Cutrer, Hattiesburg, Miss.

To prevent nuts and fruit from sinking to the bottom of a cake, heat the nuts and fruit in the oven and dust with flour before adding them to the batter.

Miss Margaret Poppel, Kent, Minn.



An old funnel makes an excellent twine holder for the kitchen. Paint the funnel a bright color and remove the old spout. Let the string come out the funnel hole.

*Mrs. Jennie Gelzer
Altheimer, Ark.*

Scatter rugs won't slip on waxed floors if you sew a can rubber on each end of the rug.

Mrs. Howard Booth, Imlay City, Mich.

Clean and brighten suede shoes by going over them with a cloth dampened with a little vinegar. Follow by brushing with a suede brush.

Eileen Bjorkman, Roseau, Minn.

Use a tiny dab of colored nail polish on the bottom of each dish you take to a picnic or public dinner. This mark of identification is inconspicuous and more secure and sanitary than tapes, threads, etc. It is also very satisfactory for labeling cream cans.



Mrs. James K. Knight, Effie, Minn.

CALORIES IN COMMON FOODS

APPROXIMATE NUMBER OF CALORIES IN AN AVERAGE SERVING

Beverages

Breakfast Chocolate	150
Coffee and Tea.....	none
Milk (whole)	200
Orange Juice (1 cup)	120
Beer (1 pint)	250

Breads and Cereals

White Bread (1 slice)	50
Whole Wheat (1 slice)	40
Rye (1 slice)	40
Cornmeal Muffins (1)	130
Biscuits (1)	100
Cereal (most kinds)	100
Wheatcakes (3)	300

Confections and Desserts

Sugar (1 tbs.)	100
Chocolate Candy (1 piece average size)	100
Cake—plain	140
chocolate	185
Doughnuts (1)	200
Pie—apple	350
pumpkin	580
custard	240
Ice Cream	300

Fruits

Apple (1 large)	100
Apricots (1)	20
Bananas (1)	100
Berries (½ cup)	50
Grapefruit, large (½)	100
Lemon	33
Orange	100

Peach, Pear	50
Plums	25

Meats

Bacon (2 strips)	50
Beef, round (⅓ lb)	240
porterhouse	360
rib	360
Serving of about ⅓ lb.	
Veal	180
Lamb	400
Pork	400
Liver	375
Chicken	200

Vegetables

(½ cup serving unless otherwise stated)	
Beans, baked	150
lima	100
string	45
Beets	50
Cabbage	65
Carrots (creamed)	65
Cauliflower	15
Celery	10
Corn (on cob) (2)	100
Onions	100
Peas (creamed)	100
Potato (white)	100
(sweet)	200
Spinach	20
Tomato (1 fresh)	50

Butter and Eggs

Butter ..	50
Egg (1)	70

KITCHEN MEASURES

45-50 drops	= 1 teaspoon
3 teaspoons	= 1 tablespoon
2 tablespoons	= 1 fluid ounce
16 tablespoons	= 1 cup
2 cups	= 1 pint
2 pints	= 1 quart
4 quarts	= 1 gallon
4 cups pastry, bread or graham flour	= 1 pound
3¾ cups whole wheat flour	= 1 pound
3 cups corn meal	= 1 pound
4¾ cups rolled oats	= 1 pound
2 cups lard	= 1 pound
2 cups butter	= 1 pound
2-2/3 cups brown sugar	= 1 pound
2 cups granulated sugar	= 1 pound
2 cups raisins (heaped)	= 1 pound
4½ cups coffee	= 1 pound
8 to 10 average eggs	= 1 pound
1 square chocolate	= 1 pound

WAXED BAGS FOR STORAGE

I save the heavy waxed bags in which gelatin desserts are sold. They are fine for packing pickles, olives, etc., in lunch boxes or for storing a bit of left-over food in the refrigerator.

Mrs. Edna Stowell, Reedsburg, Wis.

TABLE OF EQUIVALENTS

Many recipes state amounts in units of measurement not familiar to the average housewife.

It is most convenient to be able to translate these units into the terms with which one is familiar.

Following is a convenient table to refer to when in doubt.

Butter: One half pound equals one cup.
One ounce equals 2 tablespoons.

Sugar, Granulated: One half pound equals one cup. One ounce equals 2 tablespoons.

Sugar, Powdered: One half pound equals approximately 1¼ cups.

Sugar, Brown: One half pound equals 1⅓ cups.

Rice: One pound equals two cups.

Nuts: One cup shelled nuts equals about 4 ounces.

Flour, White: One quart equals approximately 1 pound.

Cocoa: One ounce equals 4 tablespoons.

Chocolate: One ounce equals 1 square or 4 tablespoons grated.

Cheese, Grated: 2 ounces equal about 1 cup.

Chicken: 3½ pounds cooked chicken yield approximately 3 cups diced chicken.

Crumbs, Bread: Two ounces equal 1 cup.

Crumbs, Cracker: ¾ cup equals 1 cup bread crumbs.

Orange: Juice of one orange equals approximately ½ cup.

Lemon: Juice of one lemon equals approximately ⅓ cup.

Rind: Grated rind of one orange or one lemon equals approximately 2 tablespoons.

Lard: One cup, packed solid, equals ½ pound.

TO MAKE PANS LAST LONGER

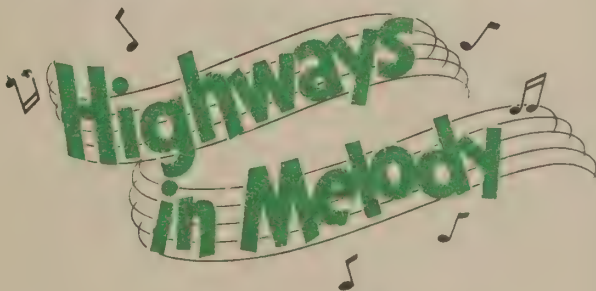
If you have a pan or pot with a small hole leak, push the protruding end of a snap fastener through the hole, hammer it flat on the outside and your pan will last much longer.

Mrs. W. H. Nelson, Wilmar, Ark.



YOUR NBC STATION
8 P.M. EWT.
7 P.M. CWT.
6 P.M. MWT.

TUNE IN FRIDAY EVENINGS

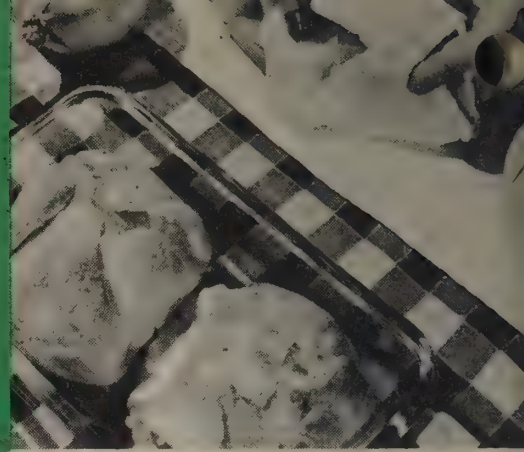


STARRING

**Paul Lavalie, the New
Cities Service Orchestra
and Famous Guest Stars**



TESTED RECIPES



SAUSAGE-STUFFED APPLES

With Spaghetti

- | | |
|-----------------------|-----------------|
| ½ lb. spaghetti | 2 tbs. butter |
| 4 apples, medium size | Salt and pepper |
| | 4 links sausage |

METHOD: Wipe and core apples, fill cavity with sausage links. Set in pan, cover bottom with water and bake until apples are tender. Cook spaghetti in boiling salted water until tender; drain. Heat butter in skillet and saute spaghetti a few minutes. Season to taste. Arrange on serving platter with the apples and sausages. This recipe will serve four.

POTATO-BURGERS

- | | |
|-----------------------------------|------------------|
| 1 lb. ground meat | 2 tsp. salt |
| 2 c. finely shredded raw potatoes | ¼ tsp. pepper |
| 4 tb. grated onion | 4 tb. shortening |

METHOD: Mix ground meat, potatoes, onion, salt and pepper. Mix and shape into cakes. Fry slowly in melted shortening until well done and brown. Turn and brown other side. These are nice served with glazed carrots and buttered peas.



BAKED IDAHO ONION DUMPLINGS

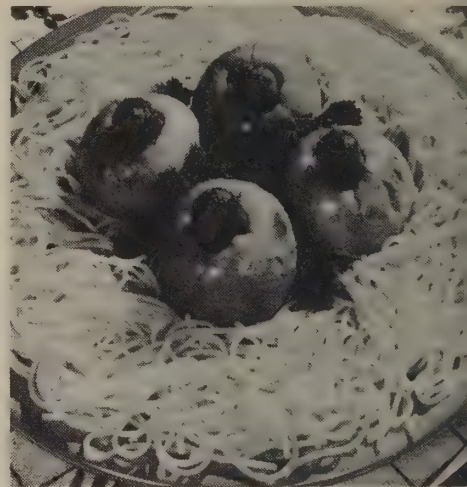
For a welcome change from routine meals, try Baked Idaho Onion Dumplings. They have such smacking fine flavor that they're bound to become a first choice of the food favorites of your family.

METHOD: Boil peeled Idaho Sweet Spanish Onions, after scoring root ends, for about 45 minutes, or until tender, in boiling salted water to cover. Drain onions and prepare rich biscuit crust. Roll and cut in 5 inch squares. Place onion, topped with a generous slice of cheese (any variety which melts easily) on each pastry square. Fold over corners and seal as for apple dumplings. Bake in hot oven 425°F. for 20 minutes, and serve with cream or cheese sauce. These are unusual and yummy! A man's favorite!

HOMINY MOUNDS *With Broiled Ham*

- | | |
|---------------------|--------------------------|
| 1 No. 2½ can hominy | 1 tsp. salt |
| 1 tb. chopped onion | ¼ tsp. pepper |
| 2 tbs. butter | 3 eggs |
| 2 tbs. flour | 4 or 6 slices boiled ham |
| ½ c. milk | |

METHOD: Drain hominy, chop slightly and add onion. Melt butter in saucepan; add flour, blend thoroughly. Add milk; cook until thick, stirring constantly. Add seasonings. Separate eggs, beat yolks and add to milk mixture. Add hominy and cook 2 minutes longer. Beat egg whites stiff and fold into mixture. Pour into well greased individual baking cups; place them in a pan half filled with boiling water; bake in moderate oven 350°F. for 40-50 minutes or until set. Unmold each on a slice of boiled ham that has been broiled. Serve with tomato or cheese sauce to which canned peas have been added. This will serve four to six people.



GARDEN PESTS AND THEIR TREATMENT

ENEMY	DAMAGE	CONTROL
TOMATOES Potato flea beetle Tomato horn worm Tomato fruit worm Cutworms Blossom-end rot Fusarium wilt Mosaic Bacterial canker Early blight Late blight	Shot holes in leaves, soon after setting out. Large, green, horned caterpillar-voracious chewer. Small striped caterpillars feed on fruit. Plants cut off at soil level. Non-parasitic disease due partly to drought. Rolling of leaves, yellowing, wilting of plants. Plants stunted, poor yields. Stem cracks lengthwise, plants wilt. Small circular spots, leaves drop off. Same as potato late blight, comes late in season.	Spray or dust with cryolite early in season. Pick off by hand. Pinch of bait, cornmeal plus 4% cryolite, at each fruit and flower cluster. Paper collar around plants at setting; poison bait. 1 part Paris green to 20 parts wheat bran; moistened. Keep well watered, avoid excess nitrogen. Resistant varieties. Destroy ground cherry, pokeweed, bittersweet hosts. Use certified seed. Spray with yellow Cuprocide for blights, starting late in season; not always wise in home garden.
BEETS AND CHARD Leaf spot Scab Spinach leaf miner	Irregular, whitish, purple-bordered spots. Rough areas over beet root. Light-colored blotches in leaves.	Remove spotted leaves; spray with Bordeaux mixture. Use lime in soil very sparingly. Remove blotched leaves.
CARROTS Leaf blight Soft rot Rust fly Weevils	Dark-colored spots on leaves. Slimy decay of roots in wet weather. Green fly lays eggs in May, maggots tunnel in roots. Beetles lay eggs in May, July, larvae tunnel in upper roots.	Bordeaux mixture; often unjustified in home garden. Plant on new land; clean up all rotten parts. Avoid by planting in June; practice rotation. Plant in new land.
CORN Ear worm	Dark purple-green caterpillar in silk end of ear.	Choose tight-eared varieties like Lincoln.
CRUCIFERS (Broccoli, Cabbage, Turnips, etc.) Maggots Worms Aphids Cabbage flea beetle Club root Yellows Black leg Black rot	Flies lay eggs near stem when sweet cherries bloom. White maggots feed on upper taproot, plants wilt. Green hairy caterpillars, striped loopers, and pale, green larvae all chew holes in leaves. Whitish or mealy lice in colonies, leaves curl. Black, yellow-striped beetle; shot holes in leaves. Irregular swellings on roots, plants wilt. Plants droop, turn yellowish-green. Cankers on stems, leaf spots, wilting. Blackened veins, leaves drop off, head rots.	Set plants in center of tar-paper squares, or dust with 1 oz. calomel mixed with 24 ozs. gypsum. Rotenone dust for crucifers, except cabbage; treat latter with pyrethrum, cryolite, or arsenicals. Pyrethrum or nicotine sulphate. Tobacco dust or cyrolite. Hydrated lime in soil 6 weeks before planting. Choose resistant varieties. Treat seed with hot water; 4-year rotation. Treat seed with hot water; 4-year rotation.
SPINACH Spinach aphid Spinach flea beetle Spinach leaf miner Downy mildew Yellows	Green louse stunts plants, transmits yellows, mosaic. Greenish-black small beetle, small round holes. Blotch mines in leaves. Yellow spots on leaves, gray mold underneath. Virus disease; mottled foliage.	Pyrethrum if available, otherwise nicotine dust. Pyrethrum. Remove infested leaves. Well-drained soil; crop rotation; sanitation. Resistant varieties.
LETTUCE Bottom rot Drop Tipburn	Leaves in contact with soil decay. Plants wilt. Caused by high temperatures and unfavorable weather. Big Boston very susceptible.	Dust Ceresan under plants two to three weeks before harvest (one treatment). Clean up. Resistant varieties.
ONIONS Smut Thrips Maggots	Dark fungus which can infect only young seedlings. Minute rasping insect turning leaves white. Flies lay eggs in May, maggots in stem and bulb.	Plant onions from sets. Spray with nicotine sulphate. Treat seed with calomel.

HOME ORCHARD SPRAYING CHART

APPLES, PEARS AND QUINCES

Time to Apply	Materials	Amount to use in 1 gal. water	in 50 gal. water	Diseases and Insects to be controlled	Remarks
1. When trees are strictly dormant.	Oil emulsions	See mfr's directions		Scale insects, red mite, pear psylla	This oil spray is important for the control of red mite and pear psylla.
2. When blossom buds are in a tight cluster.	Liquid lime sulphur or dry lime-sulphur. Nicotine sulphate Powdered lead arsenate.	1/5 pt. 5-6 T 1 t. 2-3 T	1 1/4 gal. 5 lbs. 1/2 pt. 1 1/2 lbs.	Curculio, bud-moth, aphids, apple and pear scab.	For complete information see extension Bulletin No. 154, M. S. C.
3. When buds show pink.	Same as above.	Same	Same	Same as above.	Important for scab control.
4. When most of petals have fallen.	Same as above but omit nicotine if only a few aphids and red bugs are present.	Same	Same	Apple and pear scab curculio, codling moth, red bug.	Good coverage necessary for good control.
5. Two weeks after petals fall.	Same as above.	Same	Same	Same as above.	Important for codling moth.
6. First week in July.	Lead arsenate.	2-3 T	1 lb.	Apple maggot, codling moth.	See note below.
7. Two weeks after No. 6.	Lead arsenate.	2-3 T	1 lb.	Same as above.	See note below.

NOTE: Apple maggot is one of the most serious pests in the farm orchard. Pick up dropped fruit under all trees at weekly intervals, beginning July 15, and feed them immediately to hogs or bury them. ALL MEASUREMENTS are standard measuring spoons, level full. T—tablespoon. t—teaspoon.

CHERRIES

Time to Apply	Materials	Amount to use in 1 gal. water	in 50 gal. water	Diseases and Insects to be controlled	Remarks
1. When most of petals have fallen.	*Low soluble copper compound. Lead arsenate. Nicotine sulphate.	Use mfr's recommendations. 2 T 1 t.	2 lbs. 1/2 pt.	Leaf spot. Brown rot Slugs Black aphids.	An important spray for leaf spot.
2. Two weeks after petals fall.	Same as above.	Same	Same	Same as above.	Thoroughness of application is necessary in all sprays.
3. Four weeks after petals fall.	Same as above.	Same	Same	Same as above.	If no aphids are present nicotine may be omitted.
4. About 10 days before harvest.	Wettable sulphur.	5-6 T	3 lbs.	Brown rot	Necessary for brown rot control on sweet cherry.
5. Immediately after harvest.	Proprietary copper compounds. Lead arsenate.	Use mfr's recommendations. 2 T	2 lbs.	Leaf spot Slugs	

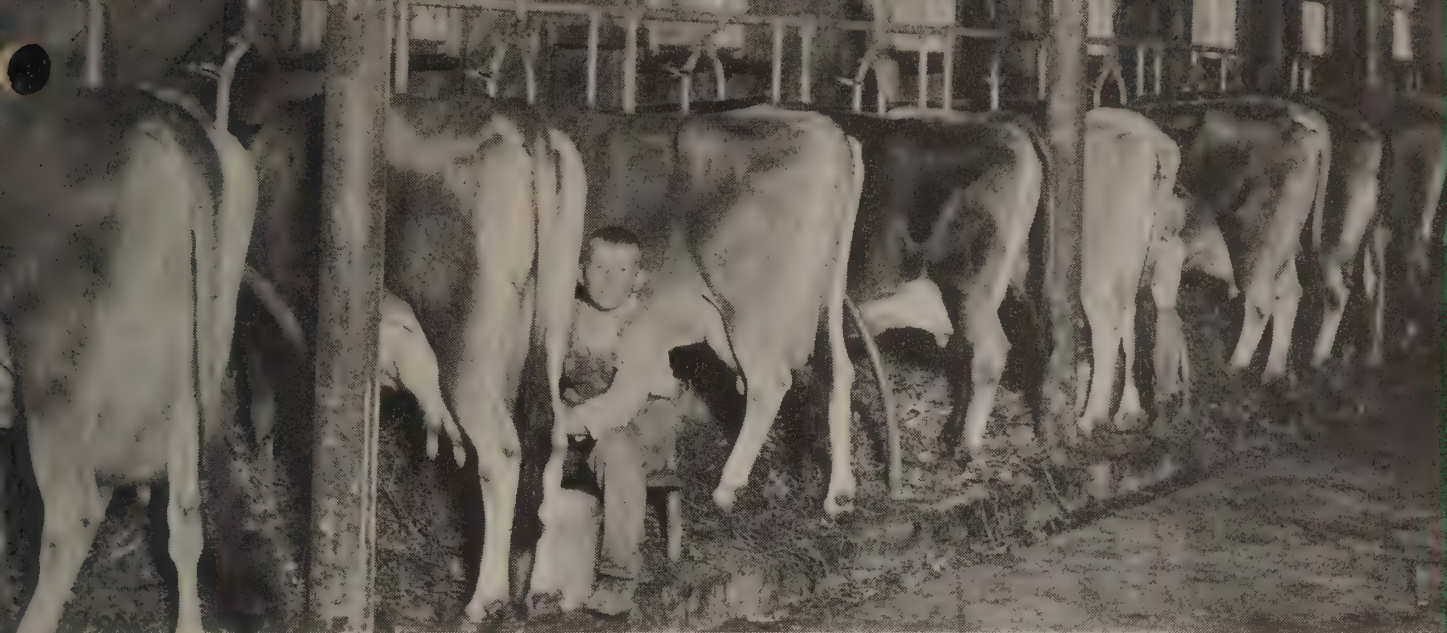
*Low soluble copper compounds are sold under proprietary names as Basicop, Bordow, Coposil, Cupro K, Oxobordeaux, Spray-Cop, etc. When used on sweet cherries, an equal amount of lime should be added.

PEACHES AND PLUMS

Time to Apply	Materials	Amount to use in 1 gal. water	in 50 gal. water	Diseases and Insects to be controlled	Remarks
1. When buds are strictly dormant.	Liquid lime sulphur.	1 pt.	6 gals.	Scale insects, peach leaf curl.	Spray on first warm days, Feb. to April.
2. Soon after petals have fallen.	Hydrated lime. Zinc sulphate. Wettable sulphur. Lead arsenate.	3-4 T 2 T 5-6 T 2 T	2 lbs. 2 lbs. 3-4 lbs. 1 lb.	Plum curculio, brown rot, scab.	Spray thoroughly. See note below.
3. 2 weeks after No. 2.	Same	Same	Same	Same	Same
4. 1 month before harvesting.	Wettable sulphur.	Use mfr's recommendations.		Brown rot scab.	Very important in brown rot control.
5. If rainy weather occurs after No. 4 repeat the application at 10 day intervals until fruit is harvested.					As above for brown rot.

NOTE: Because peach trees and some varieties of plums are susceptible to arsenical injury, lead arsenate should not be used without adding the zinc-sulphate-lime mixture.

Peach tree borers are controlled by applying crystalline paradichlorobenzene (PDB) in a ring around the trunk about Sept. 1st. One ounce of crystals to a well grown tree is placed in a ring about the base of the tree and covered with sod. Care must be taken not to place the chemical in contact with the tree. On heavy soils the sod should be removed in about three weeks and replaced with fresh soil. Do not use this treatment on trees less than four years old. Ethylene dichloride emulsion if available may be used effectively at lower temperatures instead of PDB.



ESTIMATING THE AGE OF ANIMALS BY THEIR TEETH

LOCATION OF TEETH	AGE AT ERUP- TION OF PERMA- NENT TEETH	"CUPS" DISAPPEAR FROM WEARING SURFACES OF PERMANENT TEETH	
		Lower Jaw	Upper Jaw
First pair of middle incisors . .	2½ to 3 yrs.	5½ to 6 yrs.	9 to 10 yrs.
Second pair of incisors (located at either side of "nippers") .	3½ to 4 yrs.	6½ to 7 yrs.	10 to 11 yrs.
Third pair of corner incisors .	4½ to 5 yrs.	7½ to 8 yrs.	11 to 12 yrs.

Horses

The normal processes of dentition and the changes that time brings about in tooth appearance afford a fairly reliable estimate of the age of horses. The time of eruption, the cups or depressions on the wearing surfaces and the form and direction of the teeth point definitely to different periods of life. In older horses, estimate of age

becomes more difficult; however, in general, the shape of the wearing surface gradually changes from triangular to rounded, and the direction of the teeth becomes more slanted. The chart above gives information from which a horse's age can be determined with fair accuracy.

Cattle

Practically speaking, the age of cattle is usually determined by the horns, the length of the tail and general appearance of the animal. However, the time that the teeth erupt makes a rather accurate guide of age.

There are four pairs of temporary incisors in the lower jaw that usually appear during the first few weeks of life. They are replaced by an equal number of permanent incisors that erupt about as indicated by this chart:

Teeth	Age at Eruption
First or middle pair incisors.....	15 to 18 months
Second pair of incisors.....	24 to 30 months
Third pair of incisors.....	33 to 36 months
Fourth pair of incisors.....	42 to 48 months

Sheep

Teeth provide a fairly accurate method of determining the age of sheep. The time of eruption of the permanent incisors is the determining

factor. Sheep have four pairs of incisors, all in the lower jaw. They may be expected to come through about as shown in this chart:

Teeth	Age at Eruption
First or middle pair of incisors.....	12 months
Second pair of incisors.....	24 to 27 months
Third pair of incisors.....	33 to 37 months
Fourth pair of incisors.....	48 months

FIRST AID FOR FARM ANIMALS

Heat Exhaustion



The first symptoms are likely to be "thumps," a spasmodic jerking in the belly and flanks. Often a distinct thumping sound may be heard. Gait is staggering and wobbly especially in the hind quarters. Sweating often will cease even though the animal has previously been sweating freely. Breathing is shallow and rapid, nostrils dilated—membranes bluish.

Prompt first aid is of great importance when a horse shows signs of overheating. Stop the animal immediately, in shade if possible. Apply large quantities of cold water, sponging especially the head, sides of neck, groins and flanks. Wash out mouth and nostrils with cold water and try to get the animal to drink a little every few minutes. This treatment should lower temperature rapidly. As improvement becomes evident, walk the horse slowly and rub body briskly to prevent chilling. If temperature is lowered too much, the horse is likely to die of shock.

Sore Mouth of Sheep

Sore mouth is a highly contagious disease that attacks young animals and is serious because of the danger of complications from secondary infections. Small vesicles appear on the lips, gums, or tongue, which are considerably swollen and somewhat reddened. After a few days, the vesicles become pustules. These finally rupture, leaving raw, granulated sores that bleed easily and are encrusted with thick, grayish-brown scabs. Within 3 to 4 weeks the scabs drop off, and the lesions heal, leaving no scars. Vaccine for the control of sore mouth is now commercially available. Prompt isolation of the affected animals and general sanitation of corrals, barns, sheds, etc., is advisable to control the spread of the disease.

Harness Galls

Every precaution possible should be taken to avoid shoulder galls. Sore shoulders should be treated by washing with

castile soap and warm water. Allow to dry and then apply astringent powders such as equal parts of zinc oxide and boric acid. Finely powdered epsom salts also are said to be effective. Keep collars clean. Air them in the sun after work. Wash the shoulders with a saturated salt solution at grooming time and wipe dry.

Rickets in Young Animals

Vitamins A and D are likely to be lacking in livestock rations. Too little of vitamin D will cause rickets in young animals—calves, foals, pigs, lambs, kids, pups, and chicks. Rickets may also be caused by too little calcium or phosphorus or by conditions interfering with their proper utilization, some of which are not well understood. Animals suffering from rickets should be given steamed bonemeal. In order to supply vitamin D they should be fed sun-cured roughage, such as alfalfa hay, and allowed as much exposure to the sun as possible.

Calf Scours



The prevention of overfeeding is the first step in the control of calf scours. The common practice of leaving the calf with the cow continuously for 12 to 24 hours or longer after birth is likely to result in overfeeding. The calf should nurse three to five minutes and then be separated and permitted to nurse approximately five minutes at intervals of five to six hours, or an average of four times in 24 hours. After three to five days, bucket feeding is begun. After the first week, the daily milk allowance may be increased to 8 to 12 per cent of the body weight. If scours develop, all milk should be withheld for 24 hours or longer if necessary. Four to five ounces of syrup diluted with water, several raw eggs and one or two ounces of castor oil or three ounces of mineral oil may be given daily. Intestinal astringents, blood transfusions and other medication should be given under a veterinarian's direction.

FACTS ABOUT PLANTS POISONOUS TO ANIMALS

Plant	Location	Parts of plant that usually cause poisoning	Animals most commonly poisoned	Conditions under which poisoning usually occurs and minimum quantity required	Characteristic effects
Arrowgrass (<i>Triglochin maritima</i>).	Salt or alkaline marshes and wet places throughout the United States.	Leaves and stems....	Cattle and sheep....	Eating about 1 percent of animal's weight of green plant in a few minutes.	Difficult breathing, spasms, coma, illness of short duration.
Black nightshade (<i>Solanum nigrum</i>).	Waste ground from Maine to California.	Green fruit and leaves	Cattle, sheep, goats, chickens, ducks, and geese.	Feeding on green plant....	Thirst, diarrhea, loss of appetite, weakness, lack of coordination.
Brake, bracken fern (species of <i>Pteridium</i>).	Thickets, hills, and rich woods throughout United States.	Fronds.....	Horses and cattle....	Eating 5 pounds daily for about a month.	Horses: lack of control of legs, weakness. Cattle: hemorrhages in various parts of body.
Cherry (wild) (species of <i>Prunus</i>).	Hillsides, along streams, in woods throughout United States.	Leaves.....	Sheep and cattle....	Eating 1 percent of animal's weight of green plant in a few minutes.	Difficult breathing, spasms, coma, illness of short duration.
Cocklebur (species of <i>Xanthium</i>).	In fields and waste land of the eastern half and low wet places of the western half of the United States.	First or primary leaves of seedlings.	Pigs and cattle.....	Eating 0.75 percent of animal's weight of green plant in a few minutes.	Prostration, inflamed stomach.
Dutchman's breeches (<i>Bekkula cucullaria</i>).	In woods, eastern half of United States north of Georgia.	do.....	do.....	Feeding on plant, particularly in spring and early summer.	
Horsetail, mare's tail (species of <i>Equisetum</i>).	Wet meadows throughout United States.	Tops.....	Horses.....	Eating the plant in hay....	Weakness, craving for horsetail, diarrhea, loss of flesh, lack of control of legs.
Larkspur (species of <i>Delphinium</i>).	Mountains and plains throughout United States.	Leaves of young plants.	Cattle.....	Eating 0.5 percent of animal's weight, especially of young plants, within a few minutes.	Weakness, trembling, constipation.
'Loco' (species of <i>Oxytropis</i> and <i>Astragalus</i>).	Plains and some mountain valleys, western half of United States.	Leaves and stems....	Cattle, horses, sheep, and goats.	Feeding for several days or weeks on any of the locos. ¹	Constipation, craving for loco, rough coat, incoordination, and peculiar actions.
Lupine (species of <i>Lupinus</i>) .	Throughout United States...	Leaves of young plant and fruit.	Sheep and cattle....	Eating 0.5 percent of animal's weight of green plant ¹ or fruit in a day.	Sheep: Nervousness with some species of lupine; depression with others. Cattle: Weakness and trembling.
Mountain-laurel (<i>Kalmia latifolia</i>).	Woods and hillsides.....	Leaves.....	Cattle, sheep, and goats.	Eating 0.4 percent of animal's weight of green plant in a day.	Salivation, vomiting, and weakness.
Oleander (common) (<i>Nerium oleander</i>).	Fields, roadsides, edge of woods in southern part of United States.	Leaves.....	All animals.....	Eating small quantities.....	Stupor, trembling, convulsions, paralysis, vomiting, and diarrhea.
Ragwort or groundsel (species of <i>Senecio</i>).	Throughout United States...	Leaves and stems....	Cattle and horses....	Feeding for several days on one of the poisonous species.	Jaundice, scabby nose, discomfort, loss of appetite, uneasiness, and loss of flesh.
St. Johnswort (<i>Hypericum perforatum</i>).	Fields, waste places, and hills across northern half of United States.	Leaves.....	Animals with white areas.	Feeding on the plant and being in bright sunlight.	Sore, scabby areas on white skin areas, itching, rapid respiration.
Sheep laurel (<i>Kalmia angustifolia</i>).	Moist soil, hillsides, and swamps in Maine and New York to Georgia.	Leaves.....	Cattle, sheep, and goats.	Eating 0.2 percent of animal's weight of green plant in a day.	Salivation, vomiting, and weakness.
Water hemlock (species of <i>Cicuta</i>).	Wet places throughout United States.	Roots and rootstocks.	Sheep and cattle....	Eating very small quantities	Violent spasms.
White snakeroot (<i>Eupatorium urticaefolium</i>).	Rich woods and ravines in eastern half of United States.	Leaves and stems....	Cattle and sheep....	Feeding on the plant for several days.	Marked trembling and weakness, especially after exercise.

¹Some poisonous species of *Astragalus* are not locos.

GESTATION PERIODS FOR FARM ANIMALS

Weeks or Days				Extremes	(days)	Weeks or Days				Extremes	(days)
Sow.....	16	112	109	to	120	Cow.....	40½	283	240	to	311
Ewe.....	22	150	146	to	157	Mare.....	48½	340	307	to	412

HANDY CHART FOR BREEDING RECORDS

SERVICE DATE	EXPECTED BIRTH DATE			
	MARE	COW	EWE	SOW
Jan. 1	Dec. 7	Oct. 11	May 31	Apr. 25
Jan. 11	Dec. 17	Oct. 21	June 10	May 5
Jan. 21	Dec. 27	Oct. 31	June 20	May 15
Jan. 31	Jan. 6	Nov. 10	June 30	May 25
Feb. 10	Jan. 16	Nov. 20	July 10	June 4
Feb. 20	Jan. 26	Nov. 30	July 20	June 14
Mar. 2	Feb. 5	Dec. 10	July 30	June 24
Mar. 12	Feb. 15	Dec. 20	Aug. 9	July 4
Mar. 22	Feb. 25	Dec. 30	Aug. 19	July 14
Apr. 1	Mar. 7	Jan. 9	Aug. 29	July 24
Apr. 11	Mar. 17	Jan. 19	Sept. 8	Aug. 3
Apr. 21	Mar. 27	Jan. 29	Sept. 18	Aug. 13
May 1	Apr. 6	Feb. 8	Sept. 28	Aug. 23
May 11	Apr. 16	Feb. 18	Oct. 8	Sept. 2
May 21	Apr. 26	Feb. 28	Oct. 18	Sept. 12
May 31	May 6	Mar. 10	Oct. 28	Sept. 22
June 10	May 16	Mar. 20	Nov. 7	Oct. 2
June 20	May 26	Mar. 30	Nov. 17	Oct. 12
June 30	June 5	Apr. 9	Nov. 27	Oct. 22
July 10	June 15	Apr. 19	Dec. 7	Nov. 1
July 20	June 25	Apr. 29	Dec. 17	Nov. 11
July 30	July 5	May 9	Dec. 27	Nov. 21
Aug. 9	July 15	May 19	Jan. 6	Dec. 1
Aug. 19	July 25	May 29	Jan. 16	Dec. 11
Aug. 29	Aug. 4	June 8	Jan. 26	Dec. 21
Sept. 8	Aug. 14	June 18	Feb. 5	Dec. 31
Sept. 18	Aug. 24	June 28	Feb. 15	Jan. 10
Sept. 28	Sept. 3	July 8	Feb. 25	Jan. 20
Oct. 8	Sept. 13	July 18	Mar. 7	Jan. 30
Oct. 18	Sept. 23	July 28	Mar. 17	Feb. 9
Oct. 28	Oct. 3	Aug. 7	Mar. 27	Feb. 19
Nov. 7	Oct. 13	Aug. 17	Apr. 6	Mar. 1
Nov. 17	Oct. 23	Aug. 27	Apr. 16	Mar. 11
Nov. 27	Nov. 2	Sept. 6	Apr. 26	Mar. 21
Dec. 7	Nov. 12	Sept. 16	May 6	Mar. 31
Dec. 17	Nov. 22	Sept. 26	May 16	Apr. 10
Dec. 27	Dec. 2	Oct. 6	May 26	Apr. 20

POULTRY HATCHING PERIODS

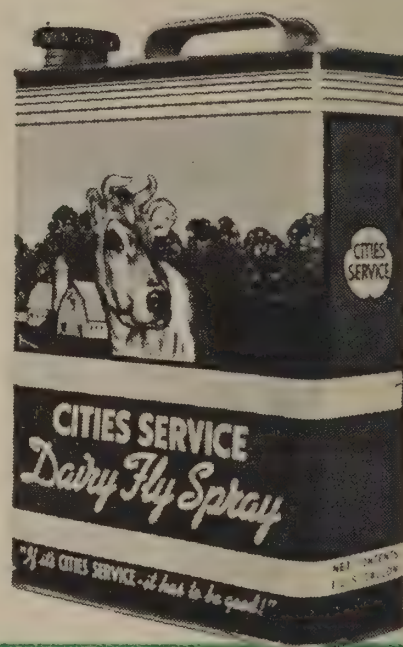
Kind of Poultry	Days	Kind of Poultry	Days
Hen.....	21	Peafowl.....	28
Pheasant.....	22-24	Guinea Fowl.....	26-28
Duck (Muscovy).....	33-35	Ostrich.....	42
Duck.....	28	Goose.....	30
Turkey.....	28	Pigeon.....	17

[illegible]

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STEP UP PRODUCTION with Cities Service **DAIRY FLY SPRAY**

Cities Service Dairy Fly Spray has helped step up milk production in the fly season. It can help you get increased production too, by helping to repel pests that may be causing your cows serious loss of milk and butter fat, loss of weight, or even disease. Dairy experts figure the cost at only about a cent a day per head. So don't delay. Order Cities Service Dairy Fly Spray *now*.



KEEP A SUPPLY ON HAND



FIGHT FLIES AND INSECTS

Cities Service Insecticide offers helpful protection from moths, fleas, ants, flies, bedbugs, mosquitoes and roaches. Spray insects in flight or in crevices where they hide. Acts quickly and surely. Stainless, when sprayed. Pure, clean odor. Inexpensive to use.



SHINGLES REQUIRED IN A ROOF

Double the rafters and multiply by length of building. Multiply by 9 if exposed 4 inches, by 8 if exposed 4½ inches, and by 7-1/5 if exposed 5 inches to the weather.

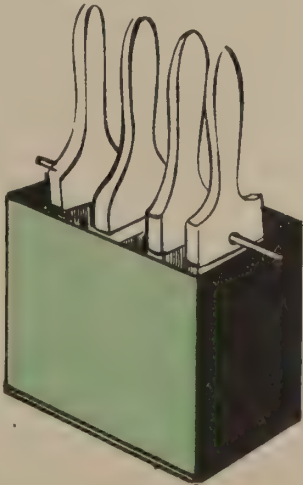
Laid 4 inches to the weather, 1,000 will cover 100 square feet.

TO FIND THE AMOUNT OF PAINT REQUIRED FOR A GIVEN SURFACE

Of course, it is impossible to give a rule that will apply in all cases, as the amount varies with the kind and thickness of the paint, the surface to which it is applied, the age of the surface, etc. An approximate rule: Divide the number of square feet of surface by 200. The result will be the number of gallons of liquid paint required to give two coats; or divide by 18 and the result will be the number of pounds of pure ground white lead required to give three coats.

BRUSH SAVER

Drill holes through brush handles and pass a rod or heavy wire through them to keep brushes from resting on bristles. The container for oil or water is a gallon



varnish can with about six inches of the top portion of the can cut off.

CONCRETE MIXTURES*

Figures below are based on the use of average moist sand.

Construction Planned	Gallons Water per Sack	Cubic Feet per Sack of Cement		Largest Size Gravel —Inches
		Sand	Gravel	
Most construction such as floors, steps, basement walls, walks, yard pavements, silos, grain bins, water tanks.....	5	2¼	3	1½
Concrete in thick sections and not subject to freezing. Footings, foundations, retaining walls, engine bases	5½	2¾	4	1½
Thin reinforced concrete milk-cooling tanks, fence posts, floors, most uses where concrete is 2 to 4 inches thick.....	5	2¼	2½	¾
Very thin concrete such as top course of 2 course floors and pavements, concrete lawn furniture, most uses where concrete is 1 to 2 inches thick.....	4	1¾	2¼	¾

* These are trial mixes for average conditions. It is particularly important not to use more water per sack of cement than shown in the table. If sand is very wet, reduce amount of water 1 gallon per sack of cement. If sand is dry, increase amount of water ½ gallon per sack of cement. Change proportions of sand and gravel slightly if necessary to get the most workable mix.

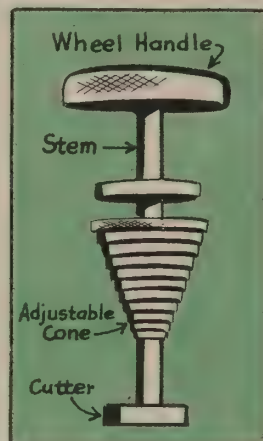
(From Portland Cement Association)

SIMPLE PLUMBING REPAIRS

There are many minor plumbing jobs that you can do yourself with only a small amount of equipment. Here are some pointers:

Leaky Faucets

When faucets leak constantly and a new washer wears out quickly, it usually indicates the seat has become nicked and grooved. It means a new faucet — unless you know how to fix the old one. All you need to make the repair is a simple seat dressing tool which costs in the neighborhood of \$2 and includes four cutters to fit different size faucets. Just remove the stem and handle of the faucet (after shutting off the water, of course) and screw the adjustable threaded cone of the tool down into body of the faucet. Then slowly rotate the wheel handle and the cutter squares the seat. Then remove all of the filings and reassemble. You've saved the cost of a new faucet!

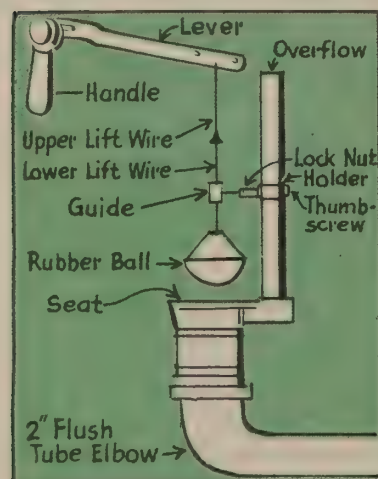


Toilet Repairs

Probably no plumbing gives as much trouble as the toilet flush tank. But most flush tank troubles are easy to correct. One of the most common troubles is that the water begins to flow all of the time. This is usually caused by a worn-out rubber ball which will no longer seat snugly

into the top of the flush pipe. Check also, to see whether the lift wire is straight and plumb. The lift wire guide is adjustable.

Another very common trouble is that the tank fills and empties continuously.



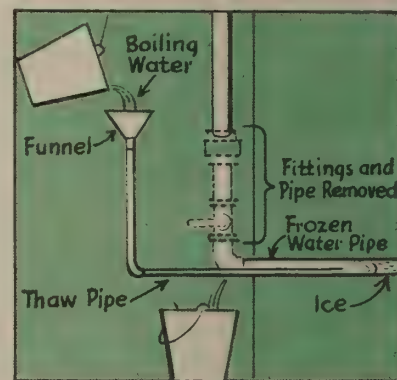
In this case, the trouble is usually corrected by replacing the rubber washer on

the flush valve with a new one. When the tank will not fill at all, the rod that carries the hollow metal ball may need adjustments or there may be a hole in the ball which should be soldered or replaced. Oil the mechanism every six months and it will work easier and better.

Frozen Pipes

In thawing pipes, never thaw the middle first. Always start at the farthest from the supply so the water will drain away. Covering frozen pipes with cloths and pouring hot water on them is simple and effective. Where there is no danger of fire, a torch or burning newspapers run back and forth along the pipe gets results.

A thawing pipe sometimes comes in handy. It is made from two lengths of pipe joined by an elbow. A funnel is put in the short end of the thaw



pipe and hot water is poured into the funnel. Pull out the thaw pipe quickly when the flow begins. Frozen traps and waste pipes can sometimes be thawed by pouring in caustic soda or lye . . . but this is poison so keep it out of the reach of children.

Small Leaks

Small leaks in a water pipe can be stopped by placing a flat rubber or leather gasket over the leak and hammering a piece of sheet metal to fit over the gasket. Secure them to the pipe with a small clamp which you can buy inexpensively at the average small hardware or 5-and-10c store.

Small leaks under low pressure can sometimes be stopped by shutting off the water and filling the hole with richly mixed portland cement mortar. A broken sewer pipe can be similarly repaired. A wrapping of light wire, embedded in the fresh concrete, increases the strength of the repair.

FARM WATER REQUIREMENTS

In planning the farm water supply, a knowledge of average daily water requirements is very helpful. The table below gives average water requirements for representative units per day.

Person (bath room)	25 gals.
Person (no bath room)	...12 gals.
Cow	10 gals.
Horse	10 gals.
Hog	 2 gals.
Sheep	 1 gal.

Since these figures are averages, a variation in the amounts of water consumed may be expected. Large cows and heavy milkers, for example, will require more water than small or dry cows. One hundred hens will drink approximately 4 gallons of water a day.

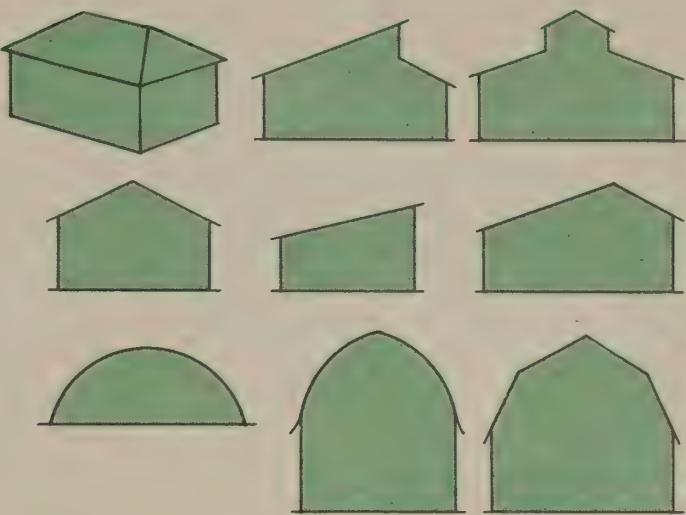
ROOF REPAIRS

Periodic inspections should be made to detect breaks, missing shingles, choked gutters, or damaged flashings, and also defective mortar joints of chimneys, parapets, coping, etc. At the first appearance of damp spots on ceilings or second-story walls, a careful examination of the roof should be made to determine the cause, and the defect promptly repaired. When repairs are delayed, small defects extend rapidly and involve not only the roof covering, but also the sheathing, framing and interior finish.

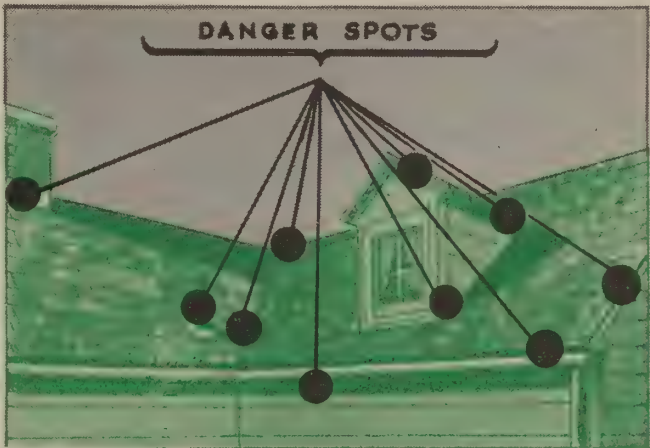
Many of the small defects that occur can be readily repaired by a practical man so as to keep water from the interior and to extend the life of the roof. Large defects or failures should be repaired by men familiar with the work because on many types of roofs an inexperienced man can do more damage than he is likely to repair.

Leaks are sometimes difficult to locate, but an examination of the wet spots on a ceiling furnishes a clue to the probable location. If near a chimney or exterior wall the leak is probably due to defective or narrow flashing, loose mortar joints, or dislodged coping. On flat roofs, the trouble may be due to the downspouts being choked or to an accumulation of water or snow on the roof higher than the flashing. On sloping roofs at valleys and at the junction of dormers with the roof, corroded, loose or displaced flashing and rotten shingles may be found. Defective and loose flashing is not uncommon around scuttles, cupolas and plumbing vent pipes.

FARM BUILDING ROOF TYPES



Illustrated above are the most widely used types of farm building shapes and roof styles.



Roofing deteriorates more rapidly on a south than on a north exposure, which is especially noticeable when wood or composition shingles are used. The south slope of a roof should be watched closely for leaks.

Wet spots under plain roof areas are generally caused by holes in the covering. Frequently the drip may occur much lower down the slope than the hole.

HOUSING SPACE REQUIRED FOR FARM ANIMALS

For Horses

Box Stalls. Box stalls should be 10 feet wide and 12 feet long.

Standard Horse Stalls are 5 feet wide and 9 to 10 feet long, including 2 feet for the manger.

Feed alleys should be 3 to 4 feet wide with a space 6 feet wide for the rear alley.

For Dairy Cattle

Mangers. The mangers should be from 20 to 30 inches wide. The front curb should be 6 to 20 inches high and the rear curb 6 to 8 inches high.

Standard Stalls

BREEDS	WIDTH	LENGTH OF STALL		
		Small	Med.	Large
Holstein.....	3'-6" to 4'-0"	4'-10"	5'- 2"	5'- 8"
Shorthorn.....	3'-6" to 4'-0"	4'- 8"	5'- 0"	5'- 6"
Brown Swiss...	3'-6" to 4'-0"	4'- 8"	5'- 0"	5'- 6"
Ayrshire.....	3'-6" to 3'-8"	4'- 6"	5'- 0"	5'- 6"
Guernsey.....	3'-4" to 3'-6"	4'- 6"	4'-10"	5'- 4"
Jersey.....	3'-4" to 3'-6"	4'- 4"	4'- 8"	5'- 0"
Heifers.....	2'-9" to 3'-2"	3'- 8"	5'-10"	4'- 2"

Calf Pens. Plan on 16 to 20 square feet of floor space for each calf. Calves over six months of age require 25 to 35 square feet. Space stanchions 20 to 24 inches apart.

Bull Pens. Bull pens are usually located in a corner of the barn to conserve space and to isolate the bull. Provide the same amount of space as for maternity pens and arrange for a door opening directly into the exercise lot.

For Beef Cattle

Plan on 40 to 60 square feet of floor area and 30-inch manger or feed rack space for each animal not confined to a pen.

For Sheep

A floor space of 12 to 16 square feet should be available for each sheep.

For Hogs

Farrowing pens should be approximately 8 feet by 8 feet or from 50 to 70 square feet.

FLOOR SPACE REQUIRED FOR POULTRY

	Sq. ft. per bird
Heavy or general purpose breeds.	4
Light breeds	3
Baby chicks	1/3

In mild climates when birds are kept in colony houses and have access to free range, the space required may be reduced to 3 sq. ft. for general purpose breeds and 2½ sq. ft. for Leghorns.

FOUNDATION REPAIRS

When concrete foundations or walls settle and crack they can be filled and thus strengthened by using a filler made of one part portland cement to two parts sand and then mixing in one part of hydrated lime to 10 parts of the sand-cement mixture. Add enough water to give the consistency of ordinary mortar. Put it on with a trowel or force it into cracks. Let the filler extend beyond the old surface for about an hour and then smooth it flush. Prevent rapid drying by covering with a wet cloth for a few days. To point up brick walls use a mortar made of equal parts of portland cement and sand; add water to make a heavy paste.

APPROXIMATE STORAGE SPACE REQUIRED FOR FARM MACHINERY

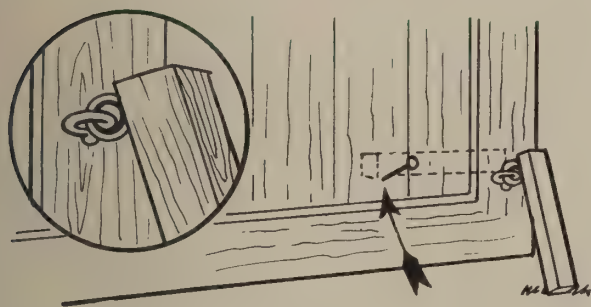
Machine	Space Required
5-ft. Mower	6x8
6-ft. Mower	7x8
12-ft. Sulky Rake	6x12
Sweep Rake	10x12
Hay Loader	9x10½
14-in. Walking Plow	2x7
16-in. Sulky Plow	3x9
Gang Plow (2 14-in.)	5x9
Tractor Plow (2 14-in.)	7½x12
2 Section Spike Tooth Harrow	3x5
7-ft. Single Disc	8x4
7-ft. Tandem Disc	8x8
Rollers	8x3
Corn Planter	6x5
1-row Corn Cultivator	6x8
2-row Corn Cultivator	7½x7
2-row Rotary Hoe	8x3
Corn Binder	9x8
Silage Cutter	7x12
Endgate Seeder	6x12
10-hole Grain Drill	5x12
6-ft. Grain Binder	9x13
7-ft. Grain Binder	9x14
8-ft. Grain Binder	10x16
Wagon	7x14
Manure Spreader	8x14
Lime Spreader	3x4
6-buhr Feed Grinder	3x3
Gas Engine	3x3
Tractor	7x12
Automobile	7x14
5-ft. Combine	10x12
10-ft. Combine	12x15
12-ft. Combine	15x15



Crumbling foundations and walls that are cracked from settling should be repaired immediately to prevent further damage. Repairs are easy to make.



TO HOLD DOORS OPEN



Two 1" x 1½" boards about 18 inches long can be used to hold garage doors open. Using screw eyes, attach one end of a board to the inside of each door. The boards should be hung so they will drag freely on the ground when the door is opened. When the door starts to swing shut, the board catches in the ground. A nail driven into the door will hold the brace out of the way when not needed.

SAVES HAMMER HANDLE



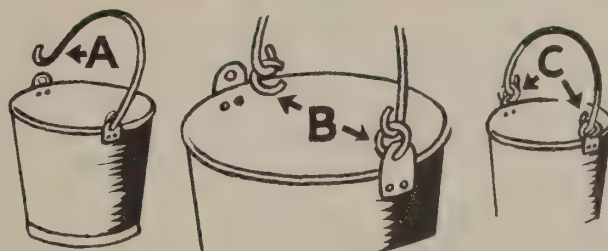
When pulling spikes, especially rusty ones which are stubborn to remove, get a piece of gas pipe about 20 inches long. Slip it over the business end of the hammer and use it as a lever. It will give more leverage and protect the hammer handle from breakage.

PIG CATCHER



With this simple device you can take a pig from the crossest sow in perfect safety. Take a piece of heavy wire about 4½ feet long and shape it into a frame resembling a fishing dip net. Drive the shanks into a strong light handle about 6 feet long. Take the bottom half of a gunny sack and sew the open end around the hook with stout cord. With this device you can lean across the fence and scoop up the small pigs.

THIS PAIL PREVENTS SLOPPING



Carrying pails of water or other liquids any distance usually finds the contents slopping on feet and clothing before the trip is finished. A pail can be made nearly slop-proof by spreading the eye of the bucket bail as shown at (A) so as to slip off the ears. Then get a link from any light chain and clip the link in the ear of the pail as shown at (B), also on the eye of the pail. The link is then closed as shown. This keeps the pail from swinging excessively and getting out of rhythm.

GET

GREATER

FUEL ECONOMY

WITH

CITIES SERVICE

FUELS



Yes, the Big Three—Power, Mileage and Savings—that's what you can get from Cities Service fuels. They are designed by our engineers to meet the most severe requirements.

CITIES SERVICE KEROSENE

Cities Service Kerosene is a water white, clean-burning fuel. Ideal for kerosene-burning tractor engines—also for stoves, space heaters, brooders and wherever a superior quality kerosene is desired.

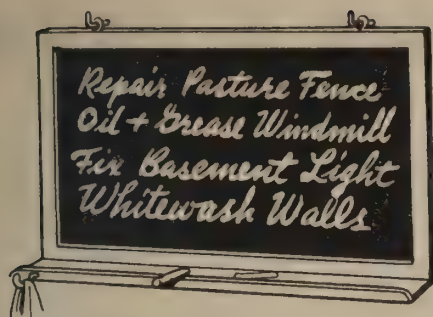
KOOLMOTOR OR CITIES SERVICE GASOLENE

All the energy from every gallon will be yours because of the carefully selected fuel components which assure well-balanced performance. Koolmotor or Cities Service Gasolene is a high-quality fuel, *timed* to burn evenly and thus give you greater power and more pleasant driving.

CITIES SERVICE DIESEL FUEL

A test will convince you that Cities Service Diesel Fuel is packed with power for greater economy. Tested and proved under the toughest operating conditions, it is endorsed by leading manufacturers of Diesel engines. Make a "tankful test" today.





Junior's cast-off blackboard makes a handy bulletin to keep posted with a list of things that need to be done.

MOUSETRAP PAPER CLIP

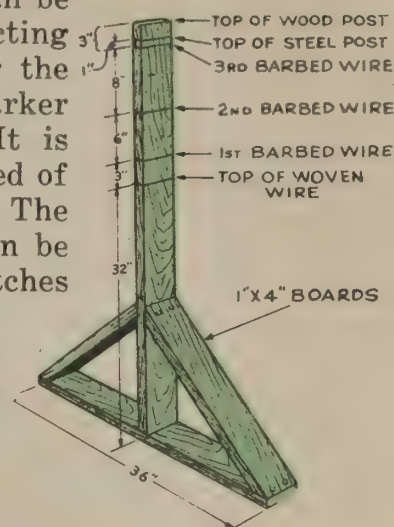
Do you find trouble keeping account notes, receipts, delivery slips, and other papers handy? Take a mousetrap, remove the trigger, and screw the wood base to the wall at some convenient place. Papers clipped under the bar are easily found.

LIST OF JOBS TO BE DONE

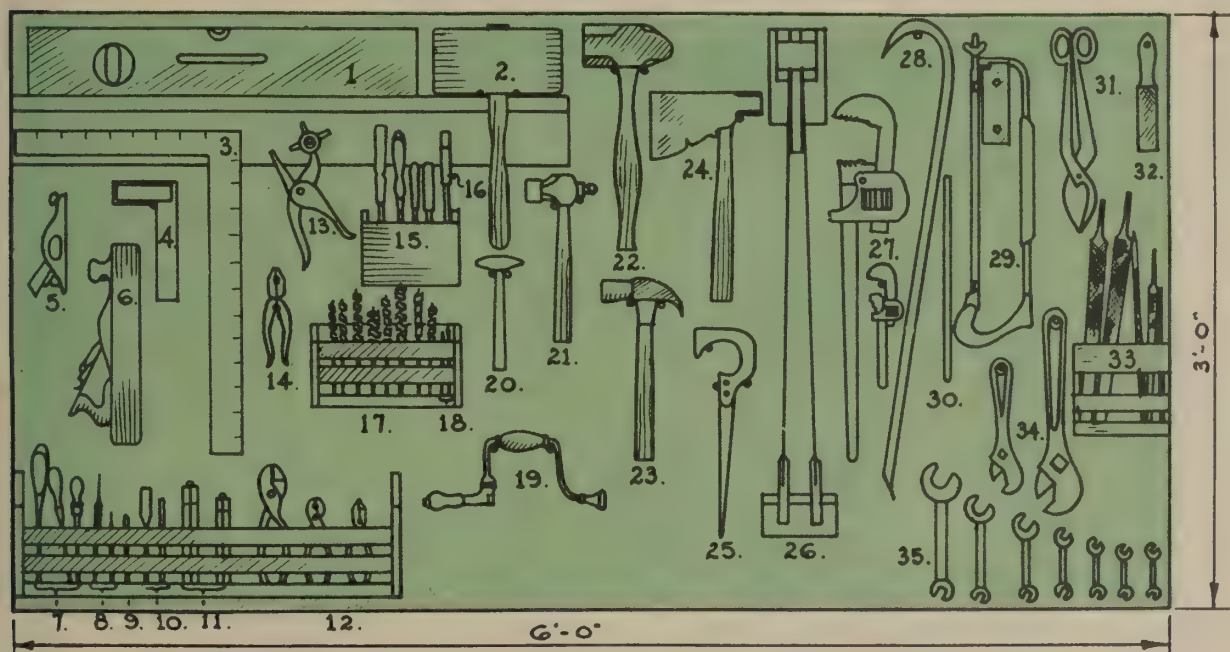
Junior's cast-off blackboard makes a handy bul-

MARKER SAVES TIME WHEN BUILDING FENCES

A lot of time can be saved when erecting fences by using the simple post marker shown above. It is easily constructed of 1" x 4" boards. The wire spacing can be indicated by notches or, if the upright is painted a light color, by black lines. If the latter system is used, each corner can be marked, making the device useful for erecting four different styles of fence.



TOOL PANEL SAVES TIME—ENCOURAGES BETTER CARE



One method of encouraging the return of tools to their proper places is to have a definite place for them. A tool panel, such as the one illustrated here, is suggested by Purdue University. A red picture of the tool, painted in the proper place on the panel, tells exactly what tools may be missing and also serves as a guide when replacing them. A key to the numbers of the tools shown on the panel follows:

1. Level
2. Mallet
3. Steel square
4. Tri-square
5. Block plane
6. Jack plane
7. Screwdrivers
8. Drift punches
9. Center punch
10. Cold chisels
11. Rules
12. Pliers
13. Leather punch
14. Electrician pliers
15. Wood chisels
16. Automatic drill
17. Auger bits
18. Nail sets
19. Brace
20. Tack hammer
21. Machinist hammer
22. Five-pound hammer

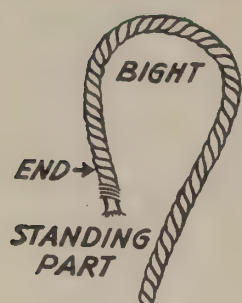
23. Claw hammer
24. Hatchet
25. Compass saw
26. Saws
27. Pipe wrenches
28. Wrecking bar
29. Hack saw
30. Blades (Hack saw)
31. Tin snips
32. File cleaner
33. Files
34. Crescent wrenches
35. End wrenches

Other desirable tools for the farm workshop (not illustrated here) would include the following:

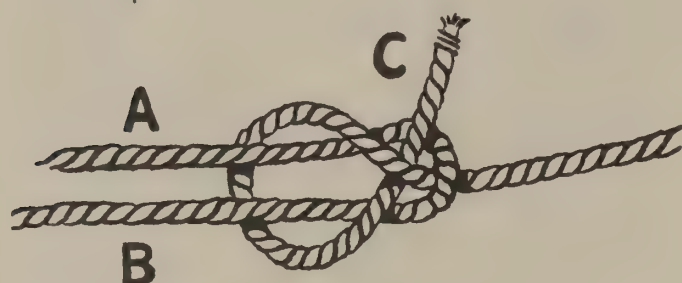
- Bench screw or "C" clamp
- Compass (dividers)
- Drawing knife
- Grindstone

- Oil can
- Scratch awl
- Tape line—50 ft. steel or cloth
- Vise—4-inch jaw or larger
- Whetstone
- Wire splicer
- Wrench (monkey) 8-inch
- Wrench (monkey) 15-inch
- Drill press (blacksmith's post)
- Drills—a set of 12 varying from $\frac{1}{8}$ in. to $\frac{1}{2}$ in.
- Forge
- Hoisting block ($\frac{1}{2}$ -inch rope)
- Jackscrew (10-ton capacity)
- Tongs
- Set of taps and dies for bolts (machine thread)
- Blow torch
- Soldering irons (pair)
- Socket wrenches
- Anvil, 100 lbs. (Steel-face cast anvil)

ROPE KNOTS USEFUL ON A FARM

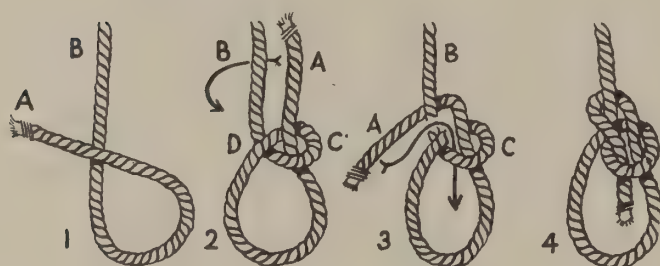


A rope always consists of the standing part and the ends. The "bight" is formed by bending the rope, keeping the two parts alongside each other.



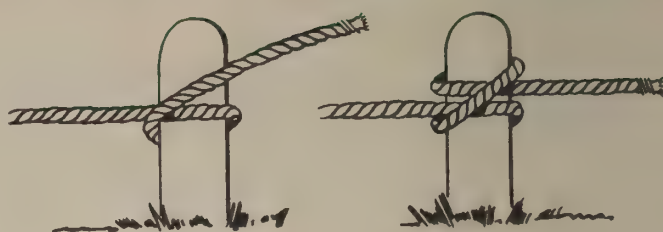
SHEET BEND

Excellent to unite different size ropes. Form a bight with the end of one rope. If there is any difference in the size, the bight should be formed with the larger. Bring the other rope, C, under the center of the bight, around end A and standing part B, over B, under its own standing part and over end A.



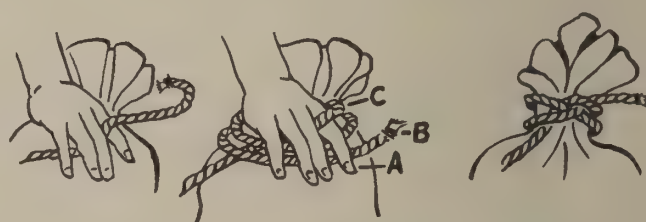
BOWLINE

Easily tied, it never slips regardless of the strain. Grasp the standing part in the left hand, palm up, and lay end A across the standing part a little below the left hand, forming a bight. (1) Holding the right forefinger over and the right thumb under the end A and the standing part B where they cross, rotate the right hand one half turn away from the body which will throw a loop in the standing part B and bring A under the standing part of B. Then take A up through loop C as shown in 2. Now, with the left palm up, hold the two parts of standing part B where they cross at D (2), between the left forefinger and thumb, and pass end A in the direction of blacked arrow under standing part, around and down through loop C and tighten up.



CLOVE HITCH

An extremely useful knot, it actually consists of two half hitches worked close together. Lay the end of the rope across the object around which the hitch is to be made, then pass the end around the object, and under the standing part as in first drawing. Then make an underhand loop around the object and pull taut.



MILLER'S KNOT

Very useful for tying sacks of flour, grain, etc. Hold the rope as shown between the forefinger and third finger. Wrap the end around once or twice, then pull end B under rope C and tighten.

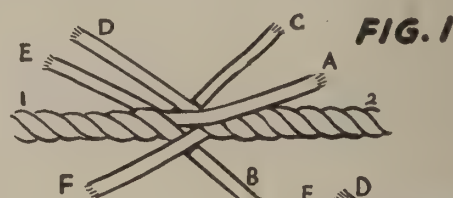


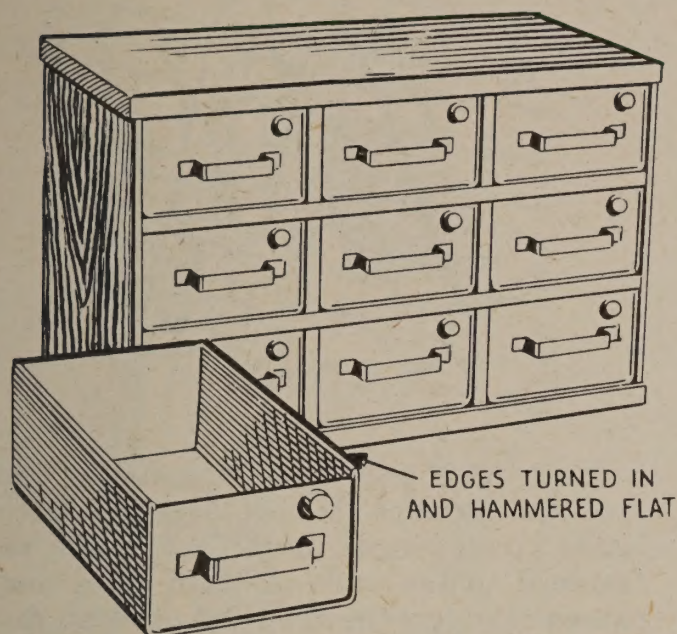
FIG. 2

SHORT SPLICE

A strong, permanent splice. Unlay both ends a sufficient length and intertwine the ends as in 1. Strands D, E & F may be temporarily stopped down to rope 1 to keep the strands securely interlocked while making the first tucks. Beginning with any one strand, tuck strands A, B & C alternately over and under one strand, as in 2. Repeat twice. Do the same with D, E & F three times.

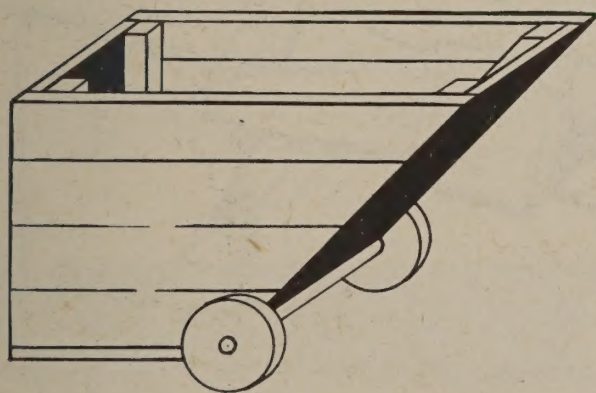
Care should be taken when cutting off ends of strands to leave sufficient end to guard against the ends of strands pulling through under heavy strain.

STORAGE CABINET FROM CANS



If you have a number of empty one-gallon oil cans, it's easy to make a handy cabinet for storing screws, bolts, nails, etc. Cut out one side of each can, turn the cut edges in, and hammer them flat to avoid injury. Make a wooden case to hold the number of cans you wish to use.

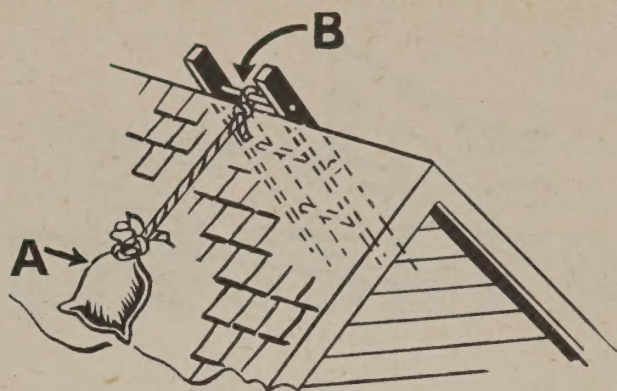
HANDY FEED CART



An old lawn mower frame with wheels can easily be made into a convenient feed cart or rubbish carrier. Make the length about two feet at the bottom and about four and one-half feet at the top, with a depth of about two and one-half feet.

Make the width so that it fits nicely within the wheels, from 15 to 18 inches wide. Use about one-inch material for the bottom and one-half or three-fourths inch for sides. Mount the box so that the wheels extend backwards rather than under the bottom which will make it balance much better.

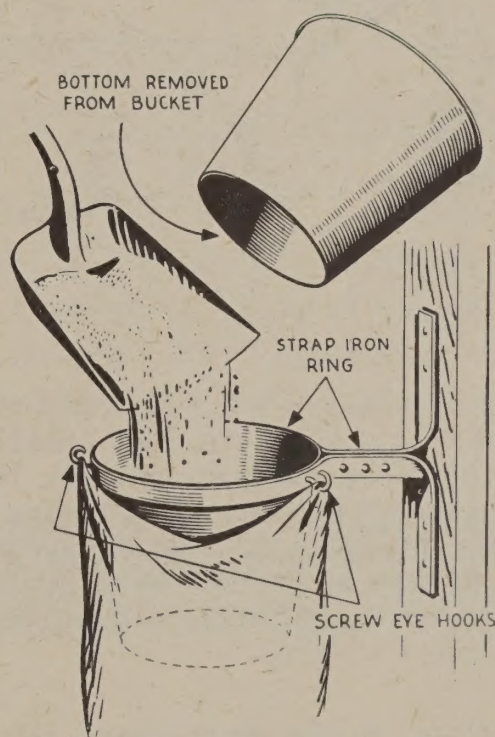
HOLDS LADDER ON ROOF



When working on metal, slate, or composition roofs where the slope is rather steep, it is sometimes a problem to find a safe way to hold the ladder. The ordinary hook ladder is liable to slip off the ridge cap or the hook damage the roofing.

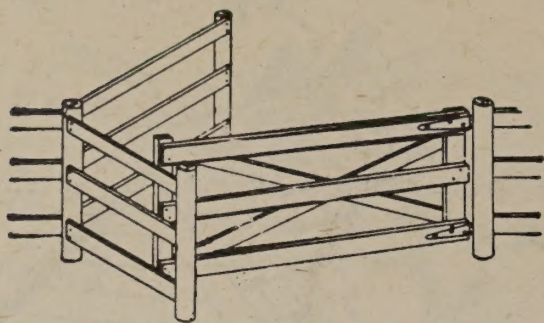
For a safe and simple ladder holder, take a strong sack filled with sand and tie it to the ladder as shown in the sketch. Use about a four-foot rope for easy handling.

FUNNEL FOR FILLING SACKS



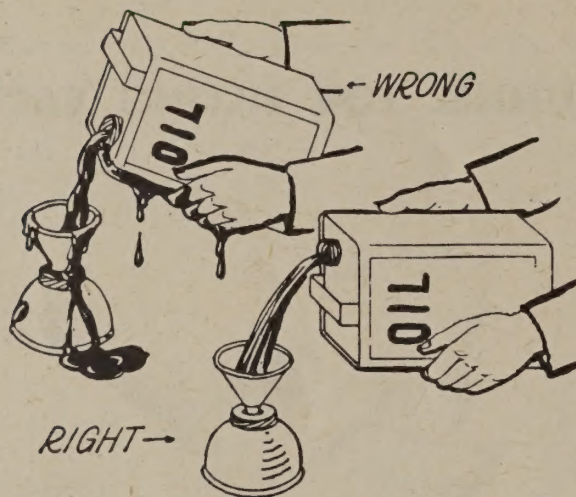
An ideal funnel for filling sacks can be made by removing the handle and bottom from a large pail. The pail can be held in the mouth of the sack by a helper or fastened to a post by means of a ring of heavy strap iron. Hooks can be fastened to the outside of the strap iron to hang the sack on. If the post is provided with a suitable base to prevent tipping, the device can be moved around and used wherever needed.

GATE ALWAYS CLOSED



In many places there is need for a gate that cannot possibly be left open. This can be easily accomplished by making one like this. A person passing through the gate shown, swings it to one side, steps into the V-shaped bay and pulls the gate back so that there is room for him to pass.

BEST WAY TO POUR OIL



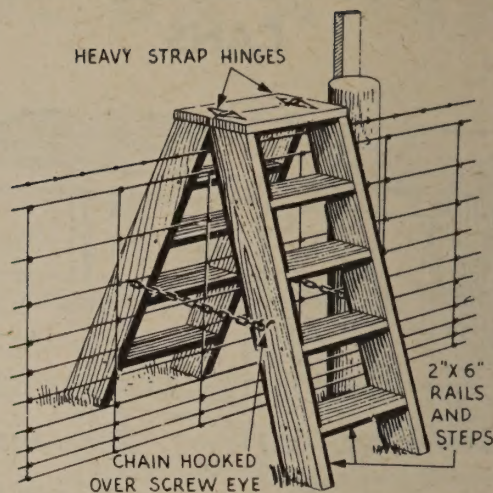
To pour oils and other liquids from the common type of tin can, don't hold the can with the spout or opening at the bottom. This causes a bubbling and gurgling as air rushes into the can. Hold the spout with the opening at the top, as shown above. This way it is possible to pour an even and small stream.

SAVE TIME FEEDING HOGS

Set the hog trough so that the end projects about a foot outside the fence. This not only saves steps but also eliminates the danger of the animals spilling the feed pail before it can be emptied into the trough.

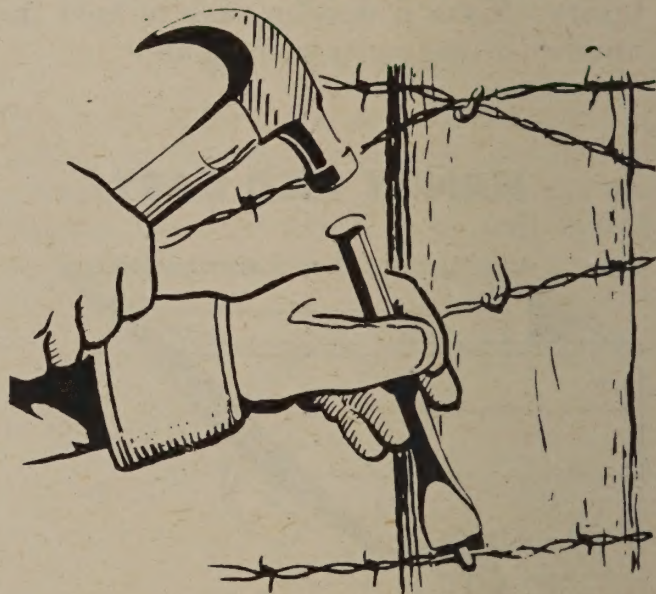
PORTABLE STILE

A stile that can be easily transported to any needed fence crossing can be built as shown above. Both rails and steps should



be made of 2" x 6" finished material and the two sections hinged together with heavy strap hinges. Light chains can be fastened to the rails on both sides and passed through the fence to prevent the legs from spreading. It should always be set up close to a post and chained or wired to the post to avoid tipping.

REMOVING OLD FENCE WIRES FROM WOODEN POSTS



To remove old fence wires from wooden posts quickly, use a cold chisel and hammer. Heavy, gauntlet-type gloves will help you avoid injury to hands and arms.

TO KEEP DRIVING BELT TIGHT

If you have trouble keeping the belt tight when using the tractor to operate a saw, grinder, or other machinery, try this: Fasten a small automobile jack to the end of an old wagon pole or post. Use a post which is long enough to reach from the tractor to the driven machine. Butt one end against the machine and the other, with the jack on it, against the tractor. When the belt becomes loose, raise the jack a notch or two.



SAFEGUARD

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If Rust Already Has Attacked...Use ***CITIES SERVICE RUST REMOVER***

You can rout rust or tarnish effectively with Cities Service Rust Remover, a clean, clear liquid, practically odorless and non-inflammable. Harmless to those not allergic to certain specific chemicals. May be applied with a stiff brush, cloth, or any convenient means ordinarily used for cleaning and polishing.

1 9 4 5

JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
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JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
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